



Cairn Duhie Wind Farm
Environmental Impact Assessment Report
Volume 1: Written Statement and Figures

Prepared by

LUC

on behalf of

RES UK and Ireland Ltd

January 2021



Preface

This Environmental Impact Assessment (EIA) Report has been prepared in support of an application by RES UK and Ireland Ltd, a subsidiary of Renewable Energy Systems Holdings Ltd (the Applicant) to the Scottish Government Energy Consents Unit (ECU) for Section 36 consent to construct and operate Cairn Duhie Wind Farm. The site is located near Ferness, Nairnshire, and is approximately 15km south-east of Nairn and 13.5km north/north-west of Grantown-on-Spey. The site is within the administrative boundary of the Highland Council. Cairn Duhie Wind Farm will comprise 16 turbines, each up to 149.9m in height to blade tip.

In addition to the above, the application is accompanied by a Planning Statement, Design and Access Statement, Pre-Application Consultation Report (PAC Report) and a Non-Technical Summary (NTS) of the EIA Report.

Copies of all these documents or further information on the proposed Development may be obtained from:

Cairn Duhie Wind Farm Team
RES Ltd.
Third Floor, STV
Pacific Quay
Glasgow

A hard copy of the EIA Report costs £1000. The NTS can be obtained free of charge. In addition, all documents are available in an electronic format (as PDF for screen viewing only) on USB for £15 by contacting the project team at cairnduhie@res-group.com or on 0141 404 5500.

The documents will also be available for viewing online on the ECU planning portal, the Highland Council planning portal and on the application website: www.cairnduhie-windfarm.co.uk.

Any representations to the application may be submitted via the ECU portal at www.energyconsents.scot/Register.aspx, by email to the Scottish Government, Energy Consents Unit mailbox at representations@gov.scot, or by post to the Scottish Government, Energy Consents Unit, 4th Floor, 5 Atlantic Quay, 150 Broomielaw, Glasgow, G2 8LU, identifying the proposal and specifying the grounds for representation.

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Chapter 1: Introduction

1. Introduction

Introduction

- 1.1 This Environmental Impact Assessment (EIA) Report has been prepared by LUC on behalf of RES UK and Ireland Ltd, a subsidiary of Renewable Energy Systems Holdings Ltd (hereinafter referred to as 'the Applicant') to accompany an application for consent to construct and operate the Cairn Duhie Wind Farm (hereinafter referred to as 'the proposed development'). The site is located near Ferness, Nairnshire, and is approximately 15km south-east of Nairn and 13.5km north/north-west of Grantown-on-Spey. The site is within the administrative boundary of the Highland Council (THC) as shown in Figure 1.1. The eastern extent of the site is parallel to the boundary of Moray Council.
- 1.2 The proposed development is located on the site of the consented Cairn Duhie Wind Farm (hereinafter referred to as the 'consented development') which was approved in 2017 and comprises 20 wind turbines up to 110m to turbine blade tip. The proposed re-design of the consented development (i.e. the proposed development) comprises 16 turbines, each up to 149.9m in height to blade tip.
- 1.3 As the proposed development has a generating capacity in excess of 50 MW, consent is required from Scottish Ministers under Section 36 of the Electricity Act 1989 (hereafter referred to as 'the Act'), in consultation with relevant statutory consultees including THC. In addition, a request is being made by the Applicant that planning permission is deemed to be granted under Section 57(2) of the Town and Country Planning (Scotland) Act 1997, as amended.
- 1.4 The application for consent is accompanied by this EIA Report which presents the findings of the EIA undertaken in accordance with the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 ('the Regulations') (as amended)¹. This EIA Report presents information on the identification and assessment of the likely significant environmental effects of the proposed development.

The Proposed Development

- 1.5 The proposed development comprises 16 turbines and associated infrastructure and is described in detail in Chapter 4: Development Description of this EIA Report.
- 1.6 The operational life of the proposed development will be 35 years. Up to 15 months are required for construction (a construction programme can be found in Chapter 4: Development Description). At the end of its operational life, the proposed development will be decommissioned which will involve the removal of the turbines and all above ground

components. An outline decommissioning strategy is provided as Appendix 4.2: Outline Construction and Decommissioning Environment Management Plan (CDEMP) and a summary of the proposed decommissioning can be found in Chapter 4.

The Applicant

- 1.7 RES is the world's largest independent renewable energy company active in onshore and offshore wind, solar energy, energy storage and transmission and distribution. At the forefront of the Industry for over 35 years, RES has delivered more than 17 gigawatts (GW) of renewable energy projects across the globe and supports an operational asset portfolio exceeding 5GW worldwide for a large client base. Understanding the unique needs of corporate clients, RES has secured 1GW of Power Purchase Agreements (PPAs) enabling access to energy at the lowest cost. RES employs more than 2,000 people and is active in 10 countries.
- 1.8 From its Glasgow office, RES has been developing, constructing and operating wind farms in Scotland since 1993. RES has developed and/or built sixteen wind farms in Scotland, with a total generation capacity of 417 megawatts (MW). RES is currently constructing Blary Hill Wind Farm in Argyll and Bute and will shortly complete construction of Solwaybank Wind Farm in Dumfries and Galloway.

Legislative Requirements for EIA

- 1.9 The proposed development exceeds the thresholds for wind farms set out within Schedule 2 of the 2017 EIA Regulations, and as it is considered that it could potentially result in significant impacts, an EIA is required. Where an EIA is required, the information must be provided to the determining authority by the Applicant in the form of an EIA Report. This EIA Report presents the findings of the EIA undertaken for the proposed development.
- 1.10 In addition, Schedule 9 (1) of the Act states that in formulating any 'relevant proposals', a person authorised to generate electricity:
- “(a) shall have regard to 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; and*
- (b) shall do what he 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.”*
- 1.11 Further details on the EIA process are provided in Chapter 2: The EIA Process.

¹ In light of the current public health advice relating to the COVID-19 outbreak, parts of the EIA Regulations were amended on 24th April 2020 by The Electricity Works (Miscellaneous Temporary Modifications) (Coronavirus) (Scotland) Regulations

2020 to temporarily relax the requirements to place hardcopies of EIA Reports in the public domain during statutory application consultation periods and to make copies available electronically.

Planning History

- 1.12 As noted above, the proposed development is located on the site of the consented Cairn Duhie Wind Farm which was submitted in 2013 as a 20 turbine scheme and consented by the Scottish Government in October 2017.
- 1.13 Following a review of technical, economic and environmental factors, RES considers that there is a need to seek to optimise the consented development to maximise the opportunity to contribute to current renewable energy targets and to ensure financial viability.

Climate Change and Renewable Energy Legislation and Policy

- 1.14 The issues of climate change, renewable energy generation and carbon dioxide (CO₂) emissions have become increasingly important in UK and indeed international policy and legislation in recent years. One of the primary aims of the UK national government is to move the UK towards a low carbon economy. This relates to all sectors of business and industry and all policy frameworks that affect the general public. In business and the public sector, this includes the Carbon Reduction Commitment Energy Efficiency Scheme and the Climate Change Levy, in energy intensive industries it includes the UK's Climate Change Agreements, in small businesses it includes energy efficient Building Regulations, and in energy supply it includes the UK's Renewable Energy Strategy. The UK's Renewable Energy Strategy (RES)² was launched in July 2009 and outlines how the UK aims to generate 15% of its energy (including electricity, heat and transport) from renewable sources by 2020. This strategy has a number of objectives which include reducing carbon emissions, decreasing reliance on fossil fuel imports and developing a sound economic foundation in renewable energy development and operation.
- 1.15 EU2 legislation and policy is, in turn, driven by international co-operation to cut the emission of greenhouse gas emissions, through the United Nations Framework Convention on Climate Change (UNFCCC). This includes the 'Kyoto Protocol'³, which became a legally binding treaty on 16th February 2005, and the 'Paris Agreement'⁴. Ratified in the UK in November 2016, the Paris Agreement sets out the ambition of holding the increase of global average temperature to "well below 2°C" and pursuing efforts to limit temperature increase to 1.5°C. In response to the national climate emergency, on 12th June 2019, the former Prime Minister Theresa May called for the UK Government to set a net-zero carbon emissions target by 2050, compared to an 80% reduction by 2050, as set by the Climate Change Act 2008⁵. It is expected that the net-zero target will be legislated by the UK Government and will supersede the Climate Change Act.

- 1.16 Although energy policy is at the discretion of UK Government, the devolved Scottish Government has also published a suite of recent policy in relation to renewable energy and climate change which continues to drive Scotland's low carbon ambitions. The following publications are particularly relevant:
- The Scottish Energy Strategy (2017)⁶;
 - The Onshore Wind Policy Statement (2017)⁷; and
 - The Climate Change Plan (2018)⁸.
- 1.17 The Climate Change (Scotland) Act 2009⁹ set targets to reduce Scotland's emissions by at least 42% by 2020 and 80% by 2050, compared to the 1990-1995 baseline. Like the UK Government, the Scottish Government also responded to the climate emergency and on 28th April, First Minister Nicola Sturgeon called on the Scottish Government to set a net-zero emissions target for 2045, five years ahead of the UK Government. This resulted in amendments being proposed to the Climate Change (Emissions Reduction Targets) (Scotland) Bill making its way through Parliament at the time, which proposed to reduce emissions by 90% by 2050 in response to advice from the Committee on Climate Change.
- 1.18 The Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 received Royal Assent on 31st October 2019 and the net-zero target is now enacted by law. The Act replaces the Climate Change (Scotland) Act 2009, giving further impetus to the increased deployment of renewable energy in Scotland. The Climate Change Plan, in its current form, is now out of date and represents the latest set of targets for the years 2028-2032 as based on the Climate Change Act 2009, setting out proposals and policies for a 66% reduction below 1990 levels. It is understood that the Scottish Government will publish a revised Climate Change Plan in due course to align with the provisions of the new Act.
- 1.19 The Scottish Energy Strategy, which calls for a 50% 'all energy' from renewables target by 2030, emphasises that onshore wind is now one of the cheapest forms of electricity and will therefore continue to play an important role in realising the Scottish Government's Climate Change ambitions. Scottish energy and climate change goals mean that onshore wind is vital to Scotland's future, and will help to decarbonise our electricity, heat and transport systems, boosting our economy, and meeting local and national demand.
- 1.20 The Onshore Wind Policy Statement sets out the up-to-date national policy position in relation to onshore wind. The Ministerial Foreword sets out that "there is no question that onshore wind is a vital component of the huge industrial opportunity that renewables more generally create for Scotland". It adds that "our energy and climate change goals mean that onshore wind will continue to play a vital role in Scotland's future - helping to substantively decarbonise our electricity supplies, heat and transport systems, thereby boosting our economy".

² Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the Promotion of the Use of Energy from Renewable Sources

³ United Nations (1998) Kyoto Protocol to the United Nations Framework Convention on Climate Change

⁴ United Nations (2015) The Paris Agreement

⁵ UK Government (2008) Climate Change Act

⁶ Scottish Government 2017, The Scottish Energy Strategy: The Future of Energy in Scotland

⁷ Scottish Government, 2017, Onshore Wind Policy Statement

⁸ Scottish Government, 2018, The Scottish Government's Climate Change Plan, Third Report on Proposals and Policies 2018-2032 (RPP3)

⁹ Scottish Government, 2009, Climate Change (Scotland) Act

- 1.21 Paragraph 3 continues to state that: *“In order for onshore wind to play its vital role in meeting Scotland’s energy needs, and a material role in growing our economy, its contribution must continue to grow. Onshore wind generation will remain crucial in terms of our goals for a decarbonised energy system, helping to meet the greater demand from our heat and transport sectors, as well as making further progress towards the ambitious renewable targets which the Scottish Government has set”*.
- 1.22 Paragraph 25 recognises the changes that are taking place in relation to the deployment of larger turbine designs, particularly in light of the move towards subsidy free schemes and thus the need for site optimisation, and states that: *“The Scottish Government acknowledges the way in which wind turbine technology and design is evolving, and fully supports the delivery of large wind turbines in landscapes judged to be capable of accommodating the without significant adverse impacts”*.
- 1.23 The implications of the Covid-19 pandemic on Scotland’s economy as a whole has highlighted the important role that the investment in renewables can play in helping Scotland rebuild its economy whilst increasing its resilience to climate change. In this way, the positive employment and economic effects of the proposed development are brought into sharp focus in the context of Scotland’s current economic situation.

Benefits of the Proposed Development

- 1.24 The principal atmospheric pollutants produced by burning fossil fuels are CO₂, sulphur dioxide (SO₂), and oxides of nitrogen (NO_x). In contrast, the harnessing of wind energy is non-consumptive and produces no gases or other by-products. The key environmental benefit of the proposed development will be the generation of electricity from a renewable energy source that will reduce or avoid the use of fossil fuels through the displacement of electricity generated from other sources of energy.
- 1.25 The purpose of the proposed development is to generate electricity from a renewable source of energy, offsetting the need for power generation from the combustion of fossil fuels. Consequently, the electricity that will be produced by the proposed development results in a saving in emissions of CO₂ with associated environmental benefit. The ‘payback time’ is defined as the length of time (in months) required for the proposed development to be considered a net avoider of emissions rather than a net emitter. The calculation of payback time includes a consideration of emissions resulting from the construction and operational phases, and the quantification of the carbon storage loss as a result of loss of peat and forestry within the site (expressed as CO₂ emissions).
- 1.26 Use of the Scottish Government’s latest carbon calculator¹⁰ with best estimate values, based on available information and assuming that fossil fuel electricity generation will be replaced,





indicates that the proposed development will pay back the carbon emissions associated with its construction, operation and decommissioning in roughly 12 months. Further details are provided in Appendix 9.5: Carbon Balance Calculation.

- 1.27 The revised design is likely to have an installed capacity of up to 67.2 megawatts (MW) and would be capable of generating low cost, clean renewable electricity for around 48,000 homes¹¹.

The Project Team

- 1.28 This EIA Report has been compiled by LUC for the Applicant. Whilst LUC had overall responsibility for the EIA Report, sub-consultants prepared specialist assessment chapters and provided input to the EIA. The members of the project team and their respective roles are presented in Table 1.1.







Table 1.1: Project Team

Chapter Number	Topic	Organisation
1 - 4	Introduction The EIA Process Design Evolution and Alternatives Development Description	LUC and RES 
5	Landscape and Visual Impact Assessment	LUC 
6	Cultural Heritage	SLR 
7 and 8	Ecology and Ornithology	MacArthur Green 

and dividing this by the annual average electricity figures from the Department of Business, Energy and Industrial Strategy (BEIS) showing that the annual UK average domestic household consumption is 3,729 kWh (2019). Final wind farm capacity will vary depending on the outcome of planning permission and turbine type selected.

¹⁰ Scottish Government (2016) Carbon Calculator Tool v1.6.0; <http://informatics.sepa.org.uk/CarbonCalculator/>

¹¹ The 48,000 homes figure has been calculated by taking the predicted annual electricity generation of the site (based on RES assessments Cairn Duhie has a predicted capacity factor of 30.97% - based on a 4.2 MW [megawatt] candidate turbine)

Chapter Number	Topic	Organisation
9	Hydrology, Hydrogeology, Geology and Peat	Wallingford Hydro Solutions (hydrology) SLR (peat slide) 
10	Traffic and Transport	Pell Frischmann 
11	Noise	RES 
12	Socio-Economics, Tourism and Recreation	LUC 
13	Other Issues	LUC (climate and major accidents and disasters) RES (aviation) 
12	Summary	LUC 

the co-ordination of statutory EIAs in the UK to make a commitment to excellence in EIA activities, and to have this commitment independently reviewed on a regular basis.

- 1.31 Details have been provided in each topic chapter (Chapters 5-13) regarding the respective author's professional expertise.

The EIA Report

Structure

- 1.32 This EIA Report presents the findings of the EIA for the proposed development during construction, operation and decommissioning. Whilst an assessment of effects during the decommissioning phase has not been undertaken, a method statement will be prepared and agreed with the relevant statutory consultees prior to decommissioning of the proposed development. The general methodology for the EIA Report is set out in Chapter 2.

- 1.33 The EIA Report consists of the following volumes and documents:

- Non-Technical Summary;
- Volume 1: Written Text and Figures (Chapters 1 - 14);
- Volume 2 and 3: LVIA Visualisations (to NatureScot and THC standards respectively); and
- Volume 4: Appendices.

- 1.34 Chapters 1-4 of Volume 1 of the EIA Report are considered to be introductory chapters and comprise the following:

- Chapter 1: Introduction (this chapter) which provides a brief introduction to the proposed development and the legislative requirements and outlines the structure of the EIA Report.
- Chapter 2: The EIA Process which provides more detail on the EIA methodology including consultation.
- Chapter 3: Design Evolution and Alternatives which defines the benefits of the proposed Development, summarises the reason for site selection and provides details of the approach to the design strategy and layout modifications.
- Chapter 4: Development Description which provides a detailed description of the proposed development and explains the context of the site.

- 1.35 Chapters 5-13 of Volume 1 of the EIA Report describe the likely significant environmental effects of the proposed development in relation to the topic areas included in Table 1.1. Chapter 14: Summary provides a consolidated summary of all likely significant effects of the proposed development identified through the EIA process.

- 1.36 The EIA Report is also accompanied by a Planning Statement, a Design and Access Statement and a Pre-Application Consultation Report.

- 1.29 Regulation 5 (5)(a-b) of the Regulations states:

“In order to ensure the completeness and quality of the EIA report—

(a)the developer must ensure that the EIA report is prepared by competent experts; and

(b)the EIA report must be accompanied by a statement from the developer outlining the relevant expertise or qualifications of such experts”.

- 1.30 The EIA process was overseen by Joanna Wright of LUC. Joanna is a Director of Environmental Planning with LUC, with an MA in Geography, an MSc in Environmental Impact Assessment and an MSc in Carbon Management. Joanna has over 20 years' experience in the management and co-ordination of EIAs for onshore wind farms in Scotland, and is a Fellow of the Institute of Environmental Management and Assessment (IEMA) and a Chartered Environmentalist. LUC is a Registrant of IEMA's EIA Quality Mark Scheme. This scheme allows organisations that lead

Availability

- 1.37 Copies of this EIA Report and further information may be obtained from RES:
- via email at cairnduhie@res-group.com; or
 - by writing to Cairn Duhie Wind Farm, 3rd Floor, STV, Pacific Quay, Glasgow, G51 1PQ.
- 1.38 The EIA Report will be available for viewing online at the Scottish Governments Energy Consents, the Highland Council planning portal and the Cairn Duhie Wind Farm website: <http://www.cairnduhie-windfarm.co.uk/>.

Representations

- 1.39 Any representations to the application may be submitted:
- via the Energy Consents Unit website at: www.energyconsents.scot/Register.aspx;
 - by email to the Scottish Government Energy Consents Unit mailbox at representations@gov.scot; or
 - by post to the Scottish Government, Energy Consents Unit, 4th Floor, 5 Atlantic Quay, 150 Broomielaw, Glasgow, G2 8LU.

Chapter 2: The EIA Process

2. The EIA Process

Introduction

- 2.1 EIA is a process which identifies the environmental effects (both positive and negative) of development proposals to assist the consenting authority in considering and determining an application. Early identification of potentially adverse environmental effects also leads to the identification and incorporation of appropriate mitigation, management and enhancement measures into the project design to avoid, reduce, and if possible, remedy potentially significant adverse environmental effects.
- 2.2 This chapter sets out the broad methodology that has been used in the EIA for Cairn Duhie Wind Farm. It provides an overview of the key stages that have been followed, in line with EIA good practice.

The EIA Process

EIA Regulations

- 2.3 The EIA Report has been prepared in accordance with the latest regulations and advice on good practice, comprising:
- The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended) ('the EIA Regulations')¹;
 - Guidance on The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000²;
 - The Scottish Government Online Onshore Wind Turbines Information, updated May 2014³;
 - Planning Advice Note 1/2013 (PAN 1/2013) Environmental Impact Assessment (2013) (amended in 2017)⁴;
 - Institute of Environmental Management and Assessment (IEMA) (2017) Delivering Proportionate EIA; and
 - Scottish Natural Heritage (SNH) Environmental Impact Assessment Handbook: Guidance for Competent Authorities, Consultation bodies and others involved in the Environmental Impact Assessment Process in Scotland (v5 April 2018).
- 2.4 This EIA Report presents the written output of the EIA process. The information contained in this EIA Report fulfils the requirements of the EIA Regulations and once submitted, will enable

the decision-making authority, in this case Scottish Ministers, to make a decision on the application for Section 36 consent, as well as the application for deemed planning permission.

- 2.5 Regulation 5 (2) of the EIA Regulations states that the following information is required in the EIA Report:
- A description of the development comprising information on the site, design, size and other relevant features of the development.
 - A description of the likely significant effects of the development on the environment.
 - A description of the features of the development and any measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment.
 - A description of the reasonable alternatives studied by the developer, which are relevant to the development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment.
 - A non-technical summary of the information.
 - Any other information specified in Schedule 4 of the EIA Regulations relevant to the specific characteristics of the development and to the environmental features likely to be affected.

Good Practice Guidance

- 2.6 PAN 1/2013 provides guidance on good practice, and the key steps to be followed in the EIA process are identified in IEMA and SNH⁵ guidance:

Scoping

- Undertake a Scoping exercise to establish likely significant effects.

Baseline Studies

- Examine, through baseline studies, the environmental character of the area likely to be affected by the development.
- Identify relevant natural and man-made processes which may already be changing the character of the site.

Predicting and Assessing Effects

- Consider the possible interactions between the development and both existing and future site conditions.

¹ Although the UK has withdrawn recently from the EU from which the EIA Regulations stem (Directive 2014/52/EU), the UK government is committed to maintaining the highest environmental standards and will continue to uphold international obligations through multilateral environmental agreements. For this reason, it is expected that it will be 'business as usual' for EIA, at least in the foreseeable future, and the current EIA Regulations remain in force.

² Whilst the guidance has not been updated for the 2017 EIA Regulations, its content remains largely relevant.

³ Whilst this Circular does not directly concern developments consented under the Electricity Act, the guidance contained within it is relevant.

⁴ Whilst this PAN does not directly concern developments consented under the Electricity Act, the guidance contained within it is relevant.

⁵ Scottish Natural Heritage (SNH) changed its name to NatureScot at the end of August 2020; due to the timescales in which the Cairn Duhie EIA Report was drafted, these terms are used interchangeably within this chapter.

- Predict and assess the possible effects, both negative and positive, of the development on the environment.

Mitigation

- Introduce design and operational modifications or other measures to avoid, reduce or offset adverse effects and enhance positive effects.

Integration

- EIA should be an iterative process which aims to ensure early consideration of environmental issues at all stages of project development and is founded on appropriate engagement with planning authorities and the Consultation Bodies. In addition to meeting the requirements of the EIA Regulations, the EIA process should add value to the design process, improving environmental outcomes and creating a framework for community engagement.

Proportionality

- EIA Reports should be fit for purpose and must be accessible to the consenting authority, consultees and the public. As such, it should focus on significant environmental effects to avoid being overly long in nature.

Efficiency

- Early identification of assessment and information requirements can ensure a coordinated EIA process and can minimise delays.

2.7 This EIA Report provides a clear and concise assessment of the proposed development and its likely significant environmental effects, including primary, secondary, direct, indirect and cumulative effects, on the natural, built and human environments. The EIA Report provides the determining authority, in consultation with statutory consultees and the wider community, with sufficient information to make an objective judgement as to the acceptability of the proposed development, within the context of national, regional and local planning and environmental policy.

EIA Methodology

2.8 Good practice in EIA is defined in several sources as set out above. The methods followed in this EIA Report have drawn on these sources to prepare a robust assessment. The EIA Report preparation process adopted for the proposed development can be summarised as follows and is described further below:

- scoping and consultation 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;
- determining how effects could be avoided or reduced through design evolution;

- identifying the potential effects of the proposed development and any proposed mitigation;
- assessing the significance of residual environmental effects on the identified receptors against recognised or defined criteria following mitigation;
- describing how likely significance of residual environmental effects on the identified receptors against recognised or defined criteria following mitigation; and
- reporting the process, results and conclusions.

Scoping and Consultation

2.9 Consultation has formed an integral part of the EIA Report preparation process, and the EIA team and the Applicant have contacted a number of interested parties over the course of the project to determine their views on the proposed development and to collect baseline information.

Scope of the EIA

2.10 A 'Scoping Opinion' can be requested from Scottish Ministers on the information to be provided within an EIA Report under Regulation 7 of the EIA Regulations. The purpose of the scoping process is to ensure that the EIA focusses on the identification of likely significant environmental effects; identifies those effects which are unlikely to need detailed study; and provide a means to reach agreement with statutory and non-statutory consultees on the most appropriate methods of impact assessment.

2.11 The Applicant submitted a request to the Scottish Government Energy Consents Unit (ECU) for a Scoping Opinion on 17th February 2020. This request was accompanied by a Scoping Report prepared by LUC, which set out a summary of the proposals; identified the issues proposed to be included in the EIA Report; and proposed an approach to the assessment of effects for each proposed topic area. The Scoping Report was simultaneously issued to a list of statutory and non-statutory consultees as agreed with the ECU, which included:

- The Highland Council (THC);
- Moray Council;
- SNH;
- SEPA; and
- HES.

2.12 A summary of the key issues raised by consultees in response to Scoping is provided in Appendix 2.1: Scoping Response Table.

Topic Areas Scoped Out

2.13 The Guidance on the Electricity Works EIA Regulations provides advice on the general requirements relating to the preparation and content of an Environmental Statement (ES)⁶ and states:

⁶ Environmental Statement (ES) was the equivalent document to an EIA Report prior to the 2017 EIA Directive.

“Whilst every ES should provide a full factual description of the development, the emphasis of Schedule 4 is on the ‘significant’ environmental effects to which a development is likely to give rise. Some effects may be of little value or no significance for the particular development in question. They will therefore need only very brief treatment to indicate that their possible relevance has been considered.”

2.14 In line with above guidance where effects have been identified (whether at scoping or during detailed assessment) as not being significant to warrant further assessment, these have been ‘scoped out’ and only briefly covered within the relevant topic chapters. Effects scoped out of the EIA are detailed in Chapters 5-13.

Consultation with Statutory and Non-Statutory Consultees

2.15 The Applicant engaged with THC via the Major Pre-application Advice Service (Ref: 18/04429/PREAPP) with a proposal to amend the consented development and received a Pre-Application Advice Pack for the proposed development in December 2018. Following review of this advice the Applicant elected to pursue a new Section 36 application rather than amend the consented development.

2.16 The Applicant also fully engaged with the ECU through the Section 36 Gatecheck process (both stages 1 and 2). The purpose of Gatecheck 1 was to allow the Applicant to seek feedback from key consultees on the design evolution, and to seek agreement on proposed methodologies and issues raised at Scoping. To inform this, the Applicant submitted a draft scoping response table to the ECU in July 2019 which set out the way in which the issues raised by consultees at Scoping would be addressed in the EIA Report. The ECU subsequently issued the information to statutory consultees seeking feedback which was taken into account in finalising the EIA Report.

2.17 The Gatecheck 2 stage provides the opportunity for an Applicant to discuss the final stages of the EIA Report preparation with the ECU to ensure that the proposed documentation being submitted with the application is in accordance with the requirements set out in the EIA Regulations, as well as any specific requirements of the ECU. The Gatecheck 2 meeting took place on 7th December 2020, where submission and advertising details were agreed.

2.18 As noted above, topic specialists have also undertaken separate consultations with statutory and non-statutory consultees to inform their assessments, and details of these consultations are provided in Chapters 5-13.

Public Consultation and Exhibitions

2.19 Prior to undertaking formal consultation at the EIA Scoping stage in February 2020, the Applicant engaged early with key stakeholders to raise awareness of the project and seek input from the host Community Council on exhibition plans. RES also undertook door to door visits in Ferness to discuss the proposal with local residents.

2.20 Public exhibition events were planned in the local area for early May 2020 to inform and consult the local community on the proposed development. However, on 24th April 2020 the

Electricity Works (Miscellaneous Temporary Modifications) (Coronavirus) (Scotland) Regulations 2020, came into effect in response to the Covid-19 pandemic and social distancing requirements, temporarily suspending the requirement for a public event in the interests of public health and safety.

2.21 In light of Covid-19, The Applicant organised an online exhibition which was held on 12th May 2020 on the Cairn Duhie website at www.cairnduhie-windfarm.co.uk. The event was advertised in advance in a range of local newspapers. Update letters were also issued to key stakeholders and a project newsletter mailed out to households within 5km of the site to provide details of the event.

2.22 The online exhibition provided a range of information on the project including:

- A welcome video (explaining why RES was re-designing the site, the purpose of the online exhibition and information available, as well as how to comment on the proposal).
- Information banners (providing information on the design layout and infrastructure, environmental considerations, transport and access, and supply chain opportunities).
- Comparative wirelines and photomontages (visualisations, to help give an impression of what the ‘re-designed’ site layout could look like from a range of local viewpoints compared to the consented development).
- Comparative Zone of Theoretical Visibility map (to help show where the ‘re-designed’ site turbines could be visible from).
- Supplementary information (consisting of more detailed drawings and maps).
- Comments form (for people to provide feedback to RES on the proposal).

2.23 All of the online exhibition information was available in hard copy upon request and remains on the project website for people to access.

2.24 RES also offered phone and Skype appointments to discuss the proposal with as many people as possible. People were encouraged to provide feedback on the proposal by filling in the online comments form or requesting a hard copy form from RES

2.25 RES continued to engage with key stakeholders after the exhibition, including holding regular virtual meetings with the host Community Council to keep them informed on project progress and to discuss any concerns, issues, or points of interest. Follow-up letters were also sent to everyone who provided feedback on the proposal to acknowledge their comments and provide an update on the project. The project website was also updated.

2.26 Further detail regarding the online exhibition and consultation feedback is captured in the Pre-Application Consultation (PAC) Report which accompanies the planning application, including how RES has taken feedback into account when developing the design.

Baseline Characterisation

2.27 The purpose of the EIA is to predict how environmental conditions may change as a result of a 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, empirical studies and projections. Together, these describe the current and future characteristics of the site and surroundings, and the value and vulnerability of key environmental resources and receptors.

- 2.28 Predictions about how parameters such as land use, landscape, views and other environmental characteristics may change in the future relies on assumptions about future development and environmental trends. For this reason, where development is not proposed in the vicinity of the site, the baseline adopted for the EIA is normally taken as the current character and condition of the site and surrounds, and the likely significant environmental effects of the development are then assessed in the context of the current conditions alone. It should be noted that whilst there is an existing consent for a 20 turbine scheme on the site of the proposed development, the baseline and future baseline is assumed to be a scenario where any form of development is absent from the site.
- 2.29 It is accepted that the baseline conditions will gradually alter through time as a result of climate change which has the potential to alter the landscape and species of flora and fauna which are currently prolific within and around the site. However, these climate change effects are unlikely to materially alter the findings of the EIA.
- 2.30 Baseline conditions, and the means by which these have been established, are set out in Chapters 5-13 of this EIA Report.
- 2.31 As natural processes and human activities can affect the baseline (‘status quo’), it is important to establish future baseline scenarios in the absence of the proposed development, i.e. the likely environmental conditions that would exist should the proposed development not be constructed.
- 2.32 Establishing the future baseline scenario requires transparent decision making as to what natural process changes and/or changes as a result of human activity should be included or excluded from the future baseline scenario.
- 2.33 Consideration of the future baseline scenario which acknowledges the absence of the proposed development is described in Chapters 5-13 of this EIA Report.

Avoidance of Effects through Design

- 2.34 EIA is an iterative process which aims to ensure early consideration of environmental issues at all stages of project development. In this way, the findings from the EIA can be fed into the design process, to avoid, reduce and if possible, offset environmental effects.
- 2.35 This approach has been followed in the design of the proposed development. Where potentially adverse significant environmental effects were identified through environmental baseline surveys, or later in the detailed EIA, consideration was given as to how the design should be modified to ‘design out’ adverse significant environmental effects, or where this was not possible, to determine appropriate mitigation. This process is explained further in Chapter 3: Design Evolution and Alternatives and in the subsequent assessment chapters (Chapters 5-13).

Identification of Likely Effects

- 2.36 Part 5 of Schedule 4 of the EIA Regulations states:
“The description of the likely significant effects on the factors specified in regulation 4(3) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the development”.
- 2.37 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 development. The significance of environmental effects is typically assessed by considering both the nature of the change (i.e. the size and duration of the effect) and the value/sensitivity of the environmental resource that experiences this effect (i.e. the receptor).
- 2.38 In accordance with the EIA Regulations, effects may be direct, indirect, secondary or cumulative. Within these categories, they may also be short, medium or long-term, permanent or temporary, beneficial or adverse. Direct (or primary) effects are changes to the baseline arising directly from activities that form part of the proposed development, for example, a localised increase in noise during construction. Indirect (or secondary) effects are those that arise as a result of a direct effect, for example deterioration of water quality in a watercourse due to a discharge could have secondary effects on aquatic biodiversity.
- 2.39 Effects 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 effect, described as adverse, neutral or beneficial;
 - the magnitude of the effect, based on a scale of major, moderate, slight, negligible and unknown;
 - the likelihood of the effect occurring, based on a scale of certain, likely or unlikely;
 - the duration of the effect, based on a scale of long, medium and short term;
 - the reversibility of the effect, 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 effect, based on a scale of high, medium and low and in some instances negligible; and
 - the occurrence of the effect during the phased implementation of the project.
- 2.40 Each of the technical chapters provides the specific criteria, including sources and justifications, for quantifying the different levels of effect. 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 effect is environmentally significant. The threshold at which effects are likely to be ‘significant’ is defined in each of the technical chapters where relevant.

2.41 Unless stated otherwise in methodologies set out in the individual assessment chapters, effects of ‘major’ or ‘moderate’ significance are considered to be ‘significant’ in the context of the EIA Regulations.

Interrelationship between Effects

2.42 Although the EIA Report is structured in standalone topic specific chapters, many of the considerations are interrelated, for example ecology and hydrology. As such, the interrelationship between potential effects between two topic areas is also considered in accordance with the EIA Regulations and addressed in Chapters 5-13

Cumulative Effects

2.43 As required by the EIA Regulations, the EIA Report considers the possible effects that a proposal may have in combination with existing or, consented developments. It also considers other proposed developments or activities. Likely cumulative effects have been defined as the likely effects that the proposed development may have in combination with other wind farms which are at application stage, consented, under construction or operational (i.e. the incremental effects resulting from the proposed development if all other wind farms are assumed to be constructed/operational).

2.44 It should be noted that the specific wind farms which are included within the cumulative effect assessment varies from one technical chapter to another according to the particular effects which are under consideration, for example all of the cumulative developments within a 40km radius are included within Chapter 6: Landscape and Visual Amenity, however this approach is not appropriate for Chapter 8: Ecology or Chapter 11: Noise due to the potential receptors being much more localised.

2.45 The list of schemes for inclusion in the cumulative assessment was agreed with consultees, and the ‘cut-off date’ of 31st July 2020 used to inform the assessment in terms of schemes for inclusion and their status⁷.

Mitigation, Enhancement and Monitoring

2.46 Part 7 of Schedule 4 of the Regulations states that an EIA Report should include: “A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example the preparation of a post-project analysis). That description should explain the extent, to which significant adverse effects on the environment are avoided, prevented, reduced or offset, and should cover both the construction and operational phases”.

2.47 The EIA has identified where there are likely to be any significant effects and where necessary identified opportunities to mitigate these effects. Making a judgement on the likely effectiveness of the mitigation measures proposed the predicted effects are then documented within this EIA Report as ‘residual effects’.

2.48 For reference, all proposed mitigation measures are set out on a topic-by-topic basis in a Schedule of Mitigation included at Appendix 14.1.

2.49 It is important to note several measures are not considered ‘mitigation’ as such but rather an integral part of the design/construction process and have been taken into account prior to assessing the likely effects of the proposed development. Where relevant, these ‘embedded mitigation measures’ and good practice measures are described in the topic chapters and are also included in Appendix 14.1.

Data Gaps, Assumptions and Uncertainty in Assessment

2.50 Part 6 of Schedule 4 of the Regulations requires that EIA Reports provide “details of difficulties (for example technical deficiencies or lack of knowledge) encountered compiling the required information and the main uncertainties involved”.

2.51 Whilst any assessment limitations are discussed in Chapters 5-13, it is considered that this EIA Report contains adequate information to enable the Scottish Ministers and consultees to review and form a reasoned conclusion on the significant effects of the proposed development on the environment.

2.52 Each topic chapter also lists the relevant assumptions that have been made when completing the assessment. Again, it is not considered that these assumptions present limitations to understanding potential significant effects.

Competent Experts

2.53 Regulation 5(5)(a) and (b) of the EIA Regulations states that:

“In order to ensure the completeness and quality of the EIA report–

(a) the developer must ensure that the EIA report is prepared by competent experts; and

(b) the EIA report must be accompanied by a statement from the developer outlining the relevant expertise or qualifications of such experts”.

2.54 As noted in Chapter 1: Introduction, a statement of competency, setting out the qualifications and experience of chapter authors is provided in the introductory paragraphs of Chapters 5-13.

⁷ Since the ‘cut-off’ date an application was submitted on the 7th August 2020 for Berry Burn Extension and Pauls Hill 2 was granted section 36 consent on 11th December 2020. These changes do not alter the findings of the assessments presented in the EIA. Further information is provided in Chapter 5: Landscape and Visual Impact Assessment.

Chapter 3: Design Evolution and Alternatives

3. Design Evolution and Alternatives

Introduction

3.1 This chapter provides details of the approach that has been taken to design the proposed Cairn Duhie Wind Farm. Details of how and why the turbine layout and associated infrastructure have been modified during the iterative EIA process are provided to explain how the proposed development described in Chapter 4: Development Description was designed. This chapter also outlines the site selection process that was undertaken by RES (the Applicant).

Site Selection

3.2 SNH's¹ Guidance 'Siting and Designing Wind Farms in the Landscape'² states that "*Developers and those involved in wind farm design should also refer to the Spatial Frameworks being developed by planning authorities in response to Scottish Planning Policy (SPP). When considering an individual application, the adopted development plan, relevant supplementary guidance, wind energy capacity studies and SPP provide the framework within which the application should be considered*".

3.3 Scottish Planning Policy (SPP) (June 2014) provides support for wind development in principle and encourages local authorities to guide developments towards appropriate locations. Paragraph 154 states that planning authorities "*should support the development of a diverse range of electricity generation from renewable energy technologies - including the expansion of renewable energy generation capacity*". It continues to state that the planning system should "*support the transformational change to a low carbon economy, consistent with national objectives and targets, including deriving:*

- 30% of overall energy demand from renewable sources by 2020;
- 11% of heat demand from renewable sources by 2020; and
- the equivalent of 100% of electricity demand from renewable sources by 2020".

3.4 Paragraph 155 also states that "*development plans should seek to ensure an area's full potential for electricity and heat from renewable sources is achieved, in line with national climate change targets*".

3.5 Paragraph 161 highlights the requirement for planning authorities to define a "*spatial framework identifying those areas that are likely to be most appropriate for onshore wind farms*". SPP states that spatial frameworks must be based on the following criteria (set out in SPP Table 1, Page 39):

- **Group 1: Areas where wind farms will not be acceptable**

- National Parks and National Scenic Areas
- **Group 2: Areas of significant protection**
 - Recognising the need for significant protection, in these areas wind farms may be appropriate in some circumstances. Further consideration will be required to demonstrate that any significant effects on the qualities of these areas can be substantially overcome by siting, design or other mitigation.
 - Group 2 areas include World Heritage Sites; Natura 2000 and Ramsar sites; Sites of Special Scientific Interest; National Nature Reserves; Sites identified in the Inventory of Gardens and Designed Landscapes; Sites identified in the Inventory of Historic Battlefields; areas of wild land as shown on the 2014 SNH map of wild land areas; carbon rich soils, deep peat and priority peatland habitat; and an area not exceeding 2km around cities, towns and villages identified on the local development plan.
- **Group 3: Areas with potential for wind farm development**
 - Beyond groups 1 and 2, wind farms are likely to be acceptable, subject to detailed consideration against identified policy criteria.

3.6 The Highland Council's Onshore Wind Energy Supplementary Guidance was adopted in November 2016. This sets out the Council's spatial framework for onshore wind development in accordance with the requirements of Scottish Planning Policy (2014). As indicated within the Supplementary Guidance, the Spatial Framework contains information on the requirements for safeguarding areas concerning onshore wind energy development. The proposed development falls partly within Group 2, requiring significant protection due to the presence of Class 1 priority peatland, and Group 3 which describes land which may be suitable for wind farm development as noted above.

3.7 The site has been selected for a number of reasons, including the following:

- there are no planning policies which, in principle, preclude wind energy development;
- the site benefits from an existing consent in the form of the consented 20 turbine Cairn Duhie Wind Farm development proposal;
- there is a good wind resource and the site is available for wind energy development;
- there are potential connection options to the electrical grid system;
- the site is a sufficient distance away from the nearest residential dwellings; and
- knowledge of the site's conditions shows that there are no environmental constraints which would preclude development.

The Site and Surrounding Area

3.8 The proposed development is situated approximately 2km to the south-east of the small settlement of Ferness (distance from the settlement to the site centre) and approximately

¹ Scottish Natural Heritage (SNH) changed its name to NatureScot at the end of August 2020; due to the timescales in which the Cairn Duhie EIA Report was drafted, these terms are used interchangeably within this chapter.

² Scottish Natural Heritage, 2017, Siting and Designing Windfarms in the Landscape (Version 3a).

15m to the south-east of Nairn (distance from the centre of Nairn to the site centre), located within the Inner Moray Firth in The Highland Council administrative area. The site is bounded to the west by the A939 road and the B9007 to the north, whilst the eastern extent is parallel to the local authority boundary with Moray Council, which is physically marked by a post and wire fence. The site covers an area of approximately 666 hectares (ha).

- 3.9 The landform of the site is characteristic of the wider landscape, comprising open upland. The low conical hill of Cairn Duhie marks the highest point of the site (at 312m Above Ordnance Datum (AOD)). Land gently slopes down from this point in all directions, reaching the lowest point to the north of the site (200m AOD). The site is enclosed by higher topography to the south and east by the Hill of Aitnoch (413m AOD) and the Knock of Braemoray (456m AOD) respectively.
- 3.10 Land cover across the site comprises a mixture of degraded bog and heath habitats with localised wooded areas and scattered mature trees, with coniferous plantations occupying areas to the north. A 275 kilovolt (kV) overhead transmission line mounted on steel towers traverses the northern part of the site.
- 3.11 There are several minor watercourses located within the site, including evidence of systematic drainage channels, as well as the Burn of Lochantùtach, which drains the southern extents of the site and is a tributary of the Dorback Burn which flows perpendicular 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 Lochan Tùtach.

The 'Do-Nothing' Scenario

- 3.12 The 'do-nothing' scenario can be considered as the existing conditions, taking account of only clearly foreseeable changes over the lifespan of the proposed development. Effects have been assessed relative to this baseline. It is accepted that the baseline conditions will gradually alter through time as a result of climate change which has the potential to alter the landscape and species of flora and fauna which are currently prolific within and around the site. However, if the proposed development does not proceed, it is reasonable to assume that the management of the site will continue as at present, largely as an area of open upland with degraded bog and heathland habitats, with localised wooded areas and scattered mature trees.

Design Strategy

- 3.13 The design strategy for the proposed development aimed to provide a balance between achieving the maximum energy yield possible from the site and creating a legible layout which relates to the landform and scale of the site and surrounding area whilst limiting, where possible, effects on other environmental features. This has been informed by relevant design guidance.

- 3.14 The starting point for the design was landscape and visual led considering landform, scale, land use pattern, cumulative interactions with other wind farms and potential effects on wider landscape designations and key tourist routes. These factors influenced how the proposed development will be perceived by people within the surrounding area and to what extent the landscape can accommodate a development.

Objectives of the Design Strategy

- 3.15 The overarching objectives of the design strategy were as follows:
- To maximise the potential energy yield of the site whilst ensuring a cohesive and sensitive layout which will be legible in key views in the surrounding area.
 - To develop a layout that responds to the underlying scale of the landform.
 - To produce a layout that will relate to the landscape setting of the site.
 - To develop a layout which avoids overbearing effects on residential visual amenity from surrounding properties (does not trigger the 'residential visual amenity threshold'³).
 - To develop a layout that relates to other wind farms in the local area.
 - To develop a layout that fulfils the above objectives whilst respecting other environmental and technical constraints including archaeological, noise, ecological, ornithological, hydrological and ground conditions (including peat) related constraints identified during the EIA process.
- 3.16 It is recognised by the Scottish Government that there is a pressing need to produce considerably more energy from renewable sources. As such, there is therefore a need to plan for considerably larger scale wind energy development, as well as other forms of renewable energy.

Scope of the Strategy

- 3.17 The design strategy sets out the overall aspiration underpinning the design of the proposed development. It describes the design starting point, as well as subsequent alterations to the layout that were made in response to environmental and technical considerations as information emerged through the EIA process.
- 3.18 During the development and evaluation of the layout design iterations, computer modelling was used as a tool to aid design. This included Zone of Theoretical Visibility (ZTV) plans which were generated and used to help understand potential visual effects, whilst wireframes were generated to illustrate views from key locations around the site, and used to consider the design iterations including the 'composition of turbines' in views from the surrounding area.
- 3.19 The main components of the proposed development considered in the design iterations were the turbines. Infrastructure features such as onsite access tracks, hardstanding areas and borrow pits, being less visible and limited to locations where elevated views across the site are possible, were designed to meet civil engineering requirements taking account of onsite

³ Terminology used in the Landscape Institutes Residential Visual Amenity Assessment Technical Guidance Note 2019

environmental constraints, whilst seeking to avoid/minimise visibility from the surrounding areas.

Design Principles

3.20 Based on a review of the site and its landscape context and scoping consultation responses, as well as advice contained in good practice guidance, including SNH's Siting and Designing Wind Farms in the Landscape, the following design principles were adopted and considered throughout the design process.

General Site Design Principles

- To avoid dense clusters of overlapping turbines. Arrange turbines as far as possible to form an evenly spaced group or array when seen from key viewpoints which maximises wind yield.
- To select an appropriate wind turbine, or turbines (tower height and blade diameter) for the site, which will generally appear to relate to the scale with the landscape and other nearby schemes.
- To remove, relocate or amend the turbine tower height of turbines which appear more elevated than the majority in key views, and those which appear as outliers, and thus, disproportionately, extend the horizontal spread of the proposed development.
- Through consultation to design a reduced lighting scheme, which minimises landscape and visual effects associated with visible aviation lighting as far as possible. Further detail is provided in Appendix 5.4.

Specific Site Design Principles

3.21 Following the identification of constraints and key issues identified through the EIA process and consultation, site specific design principles were identified and applied as part of the iterative design process. These included:

- to avoid onsite constraints as far as possible, including deep peat, ecology, ornithology, archaeology, and other technical constraints;
- to minimise visibility in views from the nearest settlement (Ferness) and in lower lying viewpoints including loch side views near Lochindorb;
- to achieve the most balanced and coherent grouping of turbines possible in key viewpoints including Ardclah Bell Tower and in sequential views from the A939 travelling north from the Cairngorms National Park;
- to avoid triggering the 'residential visual amenity threshold' from the nearest properties, refer to Appendix 5.3 for further details; and
- to consider the wider cumulative scenario and how the proposed development relates to broad patterns of wind farm groups.

Site Constraints

3.22 The final turbine layout as presented in Plate 6 and which is assessed in the EIA takes into account the design aspirations outlined above. Several technical and environmental constraints have been considered in the iterative design process, and have guided the positioning of both turbines and infrastructure, including:

- ornithology (breeding sites particularly for black grouse, capercaillie, and goshawk);
- habitats, namely Ground Water Dependant Ecosystems (GWDTEs);
- residential properties (Little Aitnoch at approximately 1.2km is the closest property to the proposed development);
- proximity to watercourses;
- geological conditions (avoiding deeper peat); and
- to respond to the underlying landform seeking to avoid turbines on top of the minor summit of Cairn Duhie.

Turbine Design

Scale

3.23 It is recognised by the Scottish Government that there is a pressing need to produce considerably more energy from renewable sources. As such, there is therefore a need to plan for considerably larger scale wind energy development, as well as other forms of renewable energy.

Turbine Colour

3.24 SNH guidance states that *"As a general 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... paint reflection should be minimised..."*.

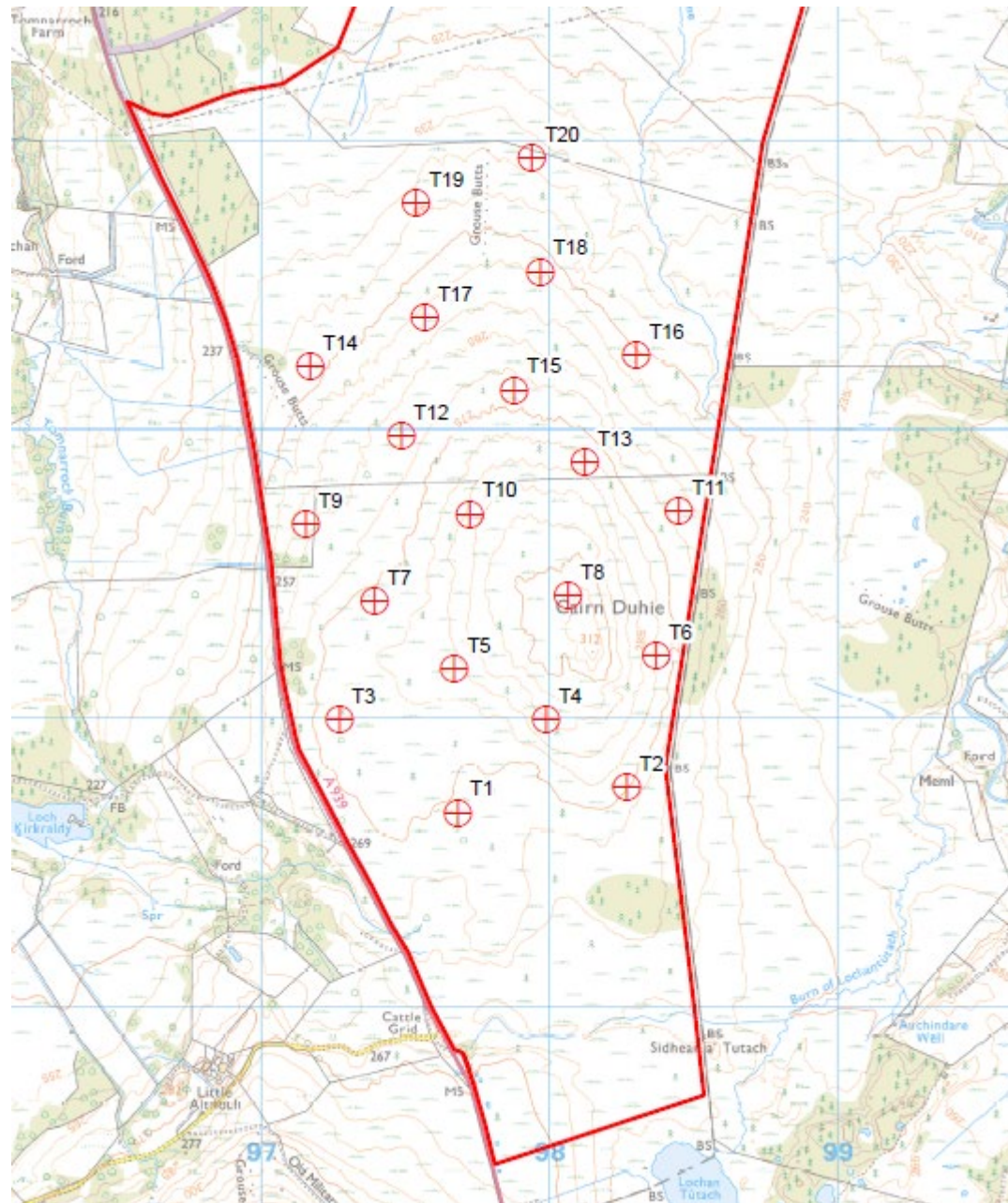
3.25 The turbines proposed for the development are to be a non-reflective light grey colour.

Modifications to Scheme Design

Layout 1: Consented Layout

3.26 The consented layout comprises 20 turbines at 110m to tip height. The layout forms an irregular single grouping of turbines on the flanks of the minor summit of Cairn Duhie. Nearby residential receptors to the south (Little Aitnoch and Aitnoch) and along the A940 to the east have focused development more so onto the western and northern flank of Cairn Duhie. The A940 and the 400kV overhead line contain the development to the north and west.

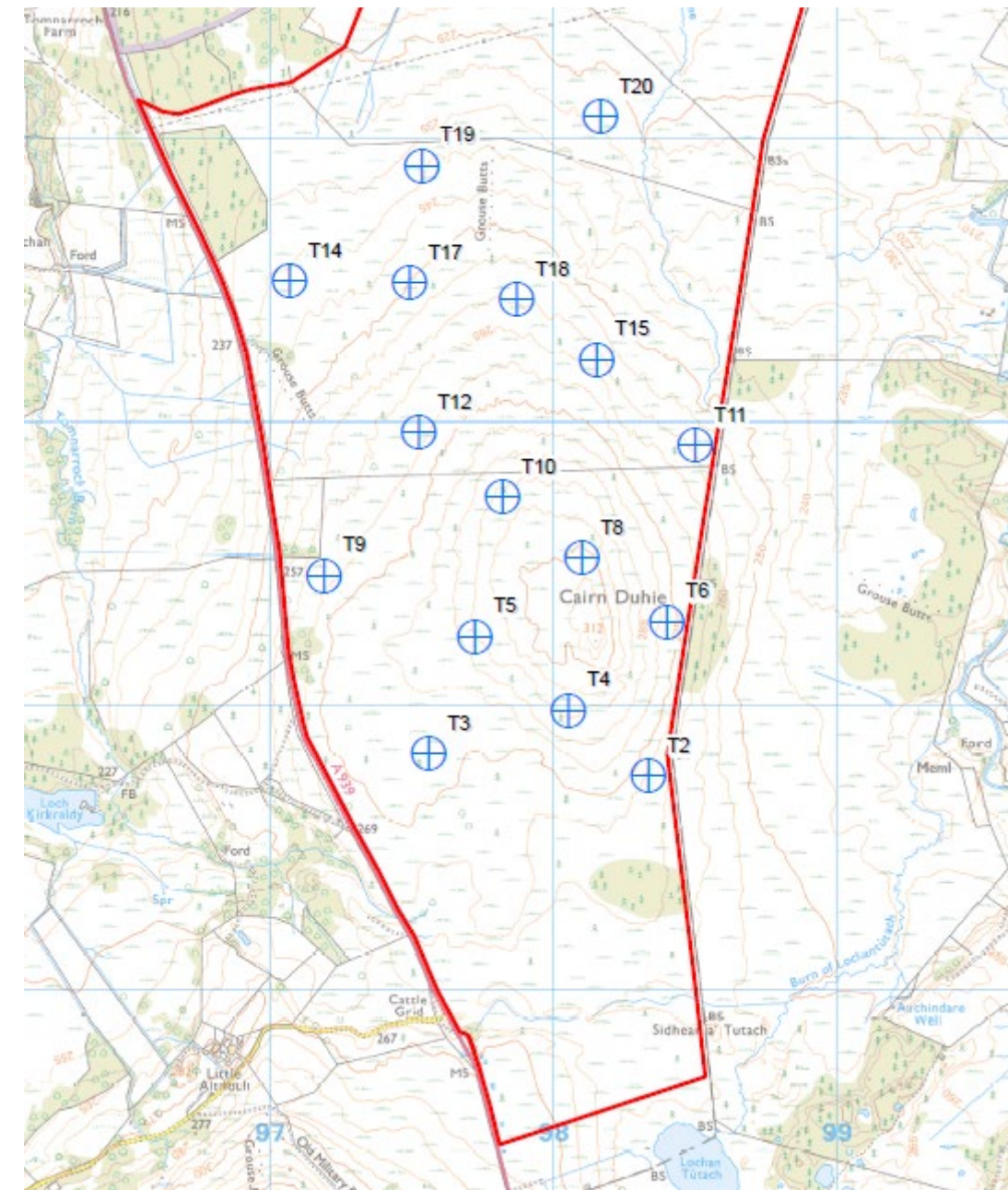
Plate 1: Layout 1 (Consented Layout)



Layout 2: Scoping Layout

- 3.27 The scoping layout comprises 16 turbines at 149.9m to tip. This layout was largely driven by avoiding onsite constraints (including telecommunications links which cross the site, deeper areas of peat and watercourses and their associated buffer) whilst keeping within the broad development footprint of the consented layout and respecting the larger separation ellipses required for turbines with a larger rotor diameter. The turbine numbering from the consented development was retained in this layout.

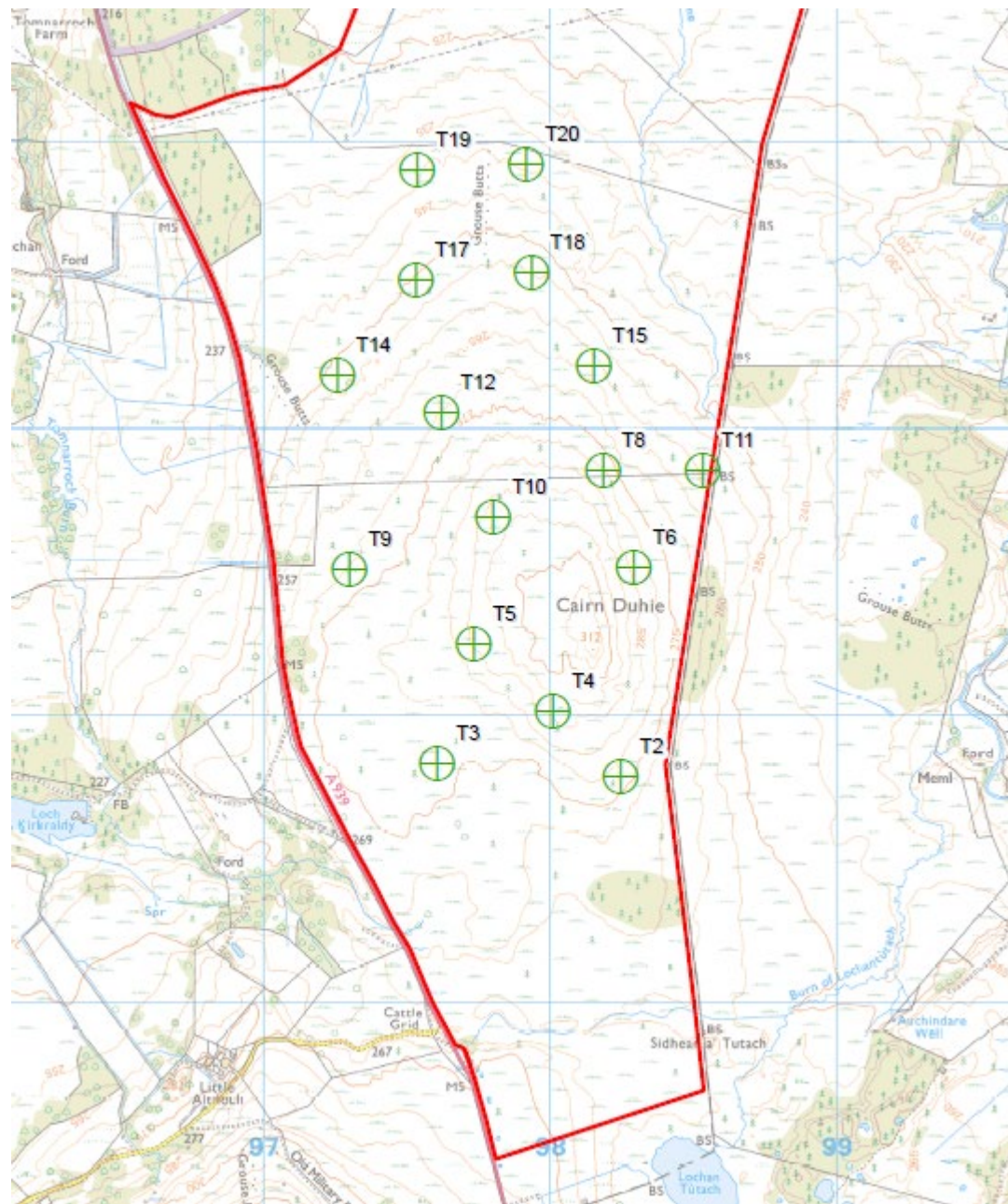
Plate 2: Layout 2 (Scoping Layout)



Layout 3: Design Iteration 1

3.28 This layout comprises 16 turbines at 149.9m to tip height. Following scoping this layout was developed at the first design workshop. It sought to refine the scoping layout to avoid stacking and overlapping turbines in key design viewpoints. This led to a more irregular grouping of turbines which broke up some of the more formal north-west to south-east rows of turbines which emerged through the scoping layout. The previously used turbine numbering was retained in this layout.

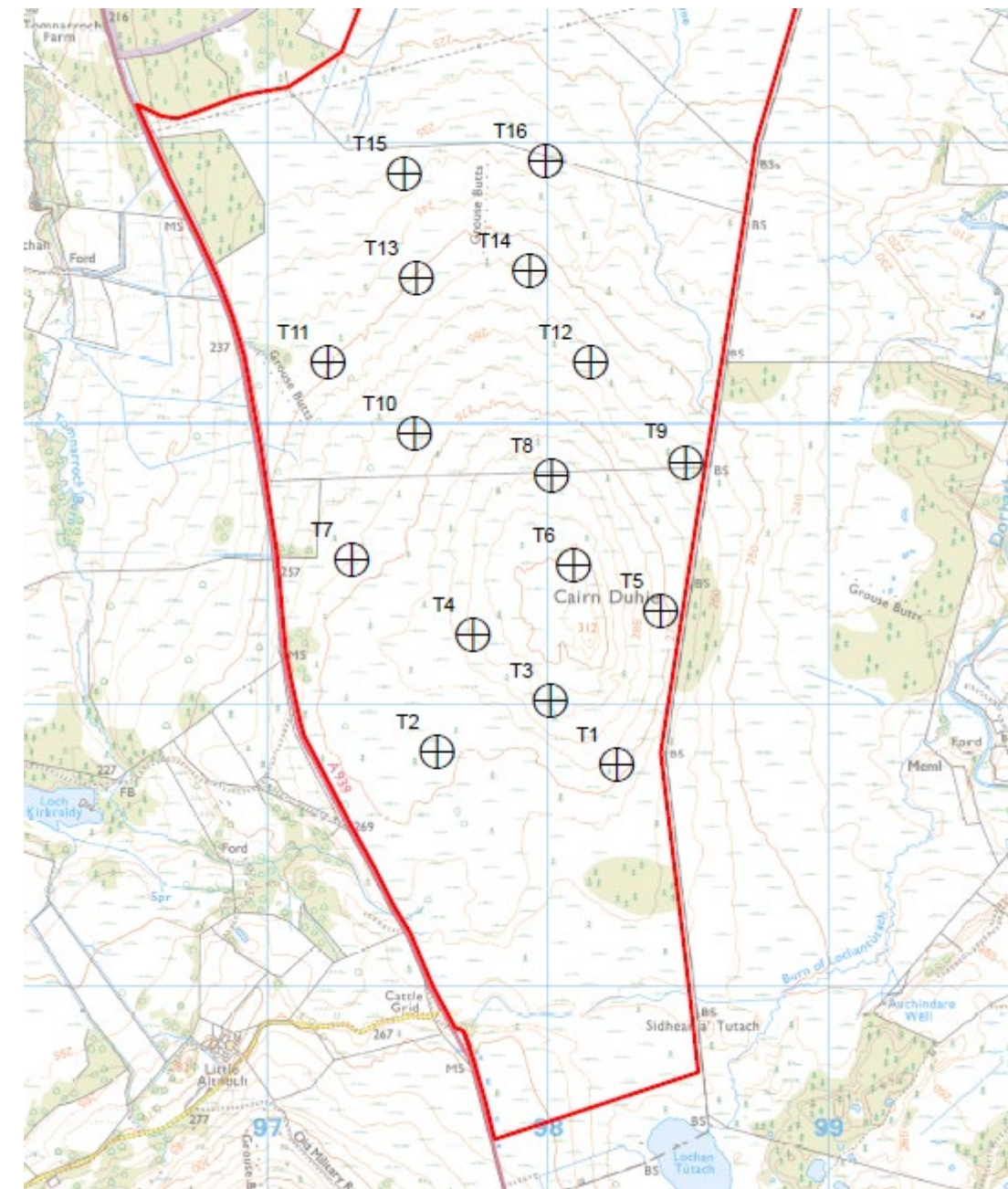
Plate 3: Layout 2 (Design Iteration 1)



Layout 4: The Proposed Development

3.29 Between the design workshop and this final layout there were a number of further refinements which sought to balance the avoidance of onsite constraints, maximise wind yield, and continue to provide the most coherent layout possible in key design views. The final layout comprises 16 turbines at 149.9m to tip height. The turbines have been renumbered in the final layout.

Plate 4: Layout 2 (The Proposed Development)



Infrastructure

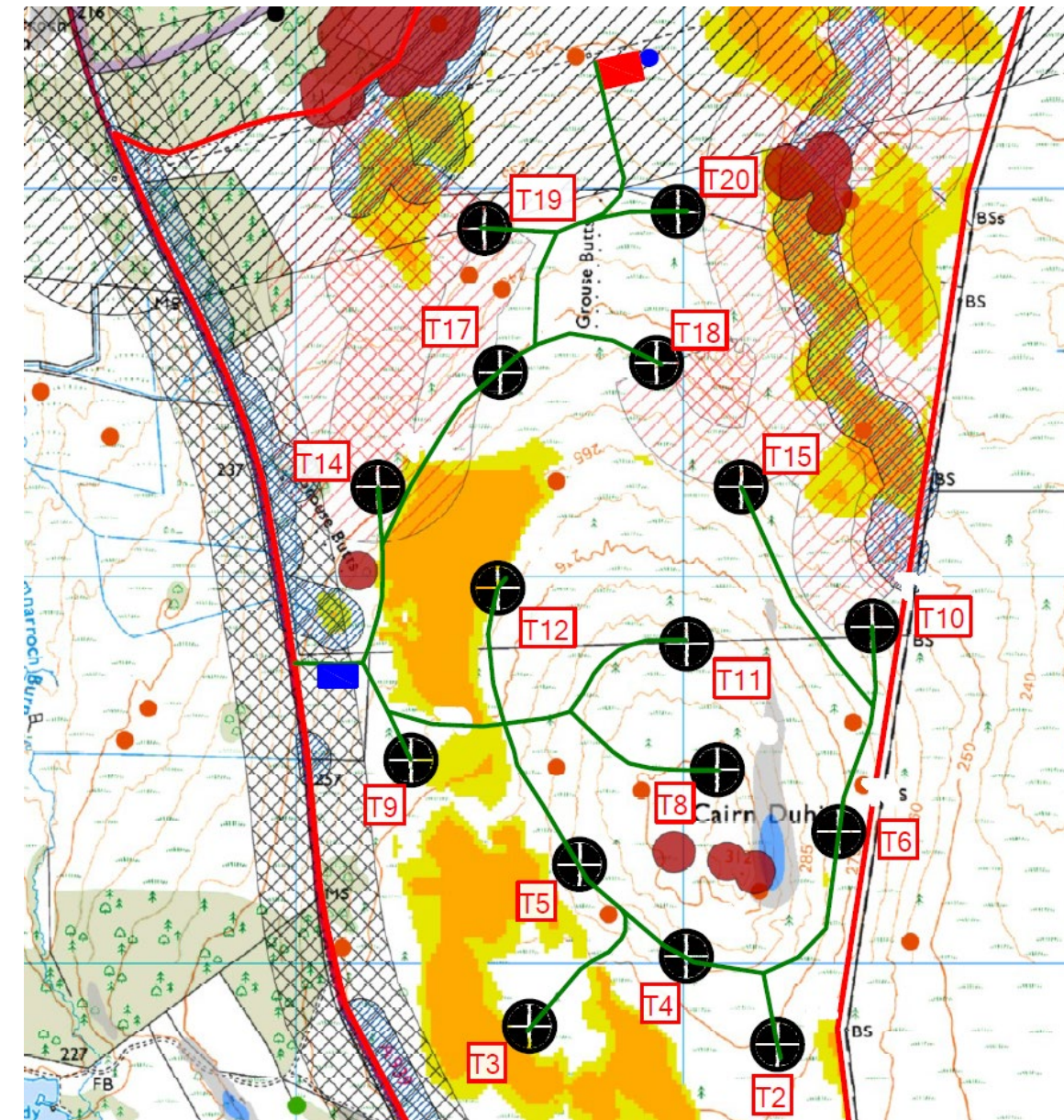
Initial Infrastructure Design

3.30 The initial infrastructure layout was the result of extensive design work, to sensitively locate the infrastructure required to facilitate construction and operation of the turbines.

3.31 The following design principles have been adhered to when designing the infrastructure:

- minimisation of track lengths to reduce impacts upon habitats and visual receptors;
- avoiding long straight sections of tracks in favour of following the natural contours of the site;
- minimisation of conflict with ecological, hydrological and other site constraints where possible;
- minimise disturbance of peat by use of floating tracks where appropriate;
- minimisation of cut and fill through appropriate routing of infrastructure where tracks cannot be floated;
- avoidance or minimisation of water crossings (there are none in the final design); and
- inclusion of engineering considerations and turbine manufacturer requirements.

Plate 5: Initial Infrastructure Design

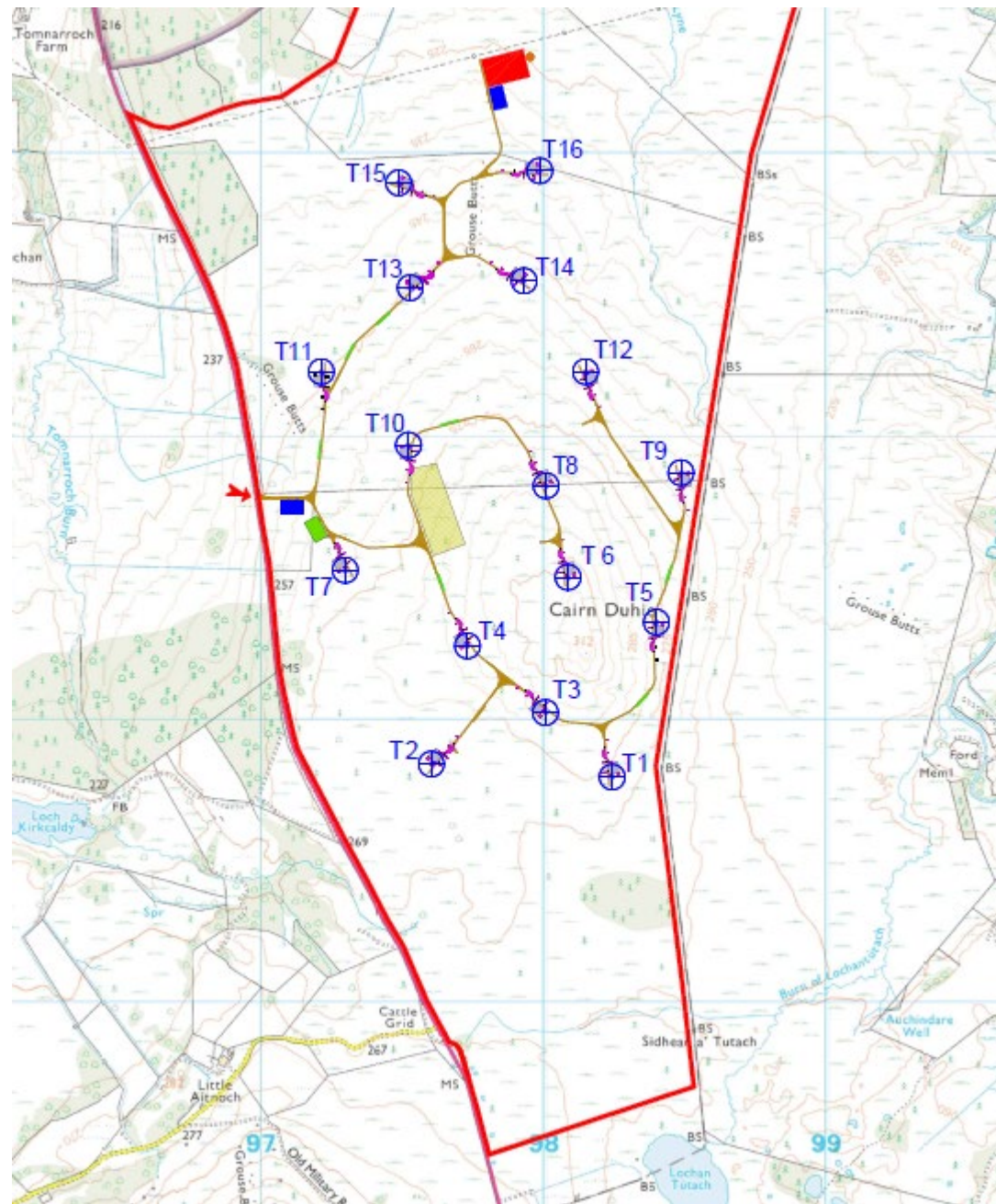


Final Infrastructure Design

3.32 Following input from specialist consultants on LVIA, ecological, hydrological, peat and other matters, the final infrastructure layout saw the configuration of auxiliary infrastructure and tracks changed to minimise and/or mitigate potential impacts upon:

- hydrology;
- groundwater dependent terrestrial ecosystems (GWDTE);
- peat and soils; and
- engineering considerations.

Plate 6: Final Infrastructure Design



Engineering Considerations

3.33 The following elements of the infrastructure required for construction and operation of the proposed development were incorporated into the design as illustrated on Plate 6 above, and shown fully on Figure 4.1, informed by the environmental constraints and conditions on the site:

- An additional temporary construction compound was added in the north of the site adjacent to the substation. This compound will be repurposed into battery storage facility during the operational life of the proposed development.
- A borrow pit search area was added in the final infrastructure design. The area of search is sited on an area identified as likely to bear suitable material by a desktop review of available geological records. It is not intended that the full area of search is utilised. Once the sufficient volume of stone has been extracted, the borrow pit search area will be fully restored.
- A batching plant which will allow onsite mixing of concrete for the turbine foundation has been added to the site infrastructure. This was relocated from the east side of the track to the west to avoid an area of deep peat.
- The Y-junction providing access to T8 & T6 was revised to a single access track more closely following the natural contours of Cairn Duhie itself, and to reduce the visual impact.
- Seven temporary and two permanent passing places have been added to the final infrastructure design.
- To allow AIL delivery access to all turbines in both forward and reverse direction, two AIL turning heads have been included at T6 & T12.
- The track between T12 & T9 was revised in favour of a spur to T12 to avoid the GWDE buffer between the two.

Scheme Design Conclusion

- 3.34 The inherent nature of wind turbines as tall, modern structures means that the form of the proposed development as a whole is important, and a clear design strategy is necessary. The overall aim of the design strategy was to create a wind farm with a cohesive layout that relates to its landscape context in line with appropriate published guidance, whilst achieving an appropriate balance between maximising renewable energy yield and minimising other environmental effects.
- 3.35 The design has sought to develop an overall cohesive layout which will be legible in key views including from Ardclach Bell Tower and in sequential views when travelling north on the A939 on departure from the Cairngorms National Park. Minimising visibility from the nearby settlement of Ferness and lochside locations near Lochindorb was also a key consideration.
- 3.36 A number of iterations were considered throughout the evolution of the design, to develop a layout that fulfils the overarching landscape and visual led objectives whilst respecting other technical and environmental constraints including ecological, ornithological, hydrological and ground conditions identified during the consultation and EIA process.
- 3.37 Overall, as a result of the iterative design approach, the effects of the proposed development have been minimised. The result of the design process is the application layout, comprising

16 turbines not exceeding 149.9m to blade tip, with associated ancillary infrastructure, both permanent and temporary, which has been carefully sited and designed to reflect economic, technical and environmental sensitivities.

Chapter4: Development Description

4. Development Description

Introduction

- 4.1 This chapter describes the components of Cairn Duhie Wind Farm (hereafter referred to as ‘the proposed development’) for which consent under Section 36 of the Electricity Act 1989 is being sought and which have been assessed through the EIA process. It includes details about the construction, operation and decommissioning of the proposed development, and outlines measures proposed to mitigate effects on the environment during these stages.
- 4.2 This chapter is supported by the following appendices:
- Appendix 4.1: Outline Borrow Pit Management Plan;
 - Appendix 4.2: Outline Construction and Decommissioning Environmental Management Plan (CDEMP);
 - Appendix 4.3: Draft Peat Management Plan; and
 - Appendix 4.4: Forestry.
- 4.3 A number of figures have also been prepared to support the chapter, which provide an overview of the key components of the proposed development.

Overview of the Proposed Development

- 4.4 The main components of the operational wind farm will comprise:
- 16 wind turbines (including internal transformers) of up to 149.9m to blade tip;
 - crane hardstanding for each turbine measuring 35m x 40m and surfaced with coarse aggregate;
 - underground electrical cables located in trenches adjacent to access tracks;
 - onsite control building and substation compound;
 - battery storage compound;
 - Two temporary construction compounds measuring 50m x 80m to provide site office facilities and storage for materials and components and 10m telecoms mast;
 - an onsite borrow pit to win stone for construction;
 - one concrete batching plant measuring 50m x 80m;
 - vehicle turning heads and junctions;
 - Approximately 8.3km of new permanent access tracks including nine passing places;
 - forestry management; and
 - site signage.

- 4.5 Figure 4.1 shows the detailed infrastructure layout of the proposed development and each of the key components noted above is detailed further below with supporting figures. Table 4.1 below details the coordinates of the proposed wind turbine locations.

Table 4.1: Summary of Residual Effects

Turbine ¹	X	Y
T1	298244	841792
T2	297604	841838
T3	298008	842020
T4	297732	842256
T5	298401	842340
T6	298088	842499
T7	297299	842524
T8	298010	842823
T9	298488	842869
T10	297523	842967
T11	297214	843227
T12	298150	843227
T13	297529	843524
T14	297932	843548
T15	297488	843895
T16	297988	843938

Components of the Proposed Development

Wind Turbines

- 4.6 Consent is being sought for the installation and operation of 16 three bladed horizontal axis turbines with a maximum blade tip height of 149.9m. For visual and acoustic assessment purposes, the most suitable candidate turbine available in the marketplace (currently of 4.2MW nominal capacity and with an overall height to blade tip of 149.9m) has been assumed. Most 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 match the 149.9m tip height specification being suggested for the proposed development. Exact tower and blade dimensions vary marginally between manufacturers, but suitable turbines are produced by Siemens, GE and Vestas, amongst others. A diagram of a typical 149.9m tip height turbine is shown in Figure 4.2. The colour and finish of the wind turbine blades, nacelles and

¹ Note that there is no turbine 1, 7, 13 or 16 as these were removed from the layout of the consented development, and the layout of the remaining turbines adjusted to optimise the layout.

towers would be agreed with the Scottish Government Energy Consents Unit (ECU) and is expected to be the subject of a condition of consent.

- 4.7 The turbine blades will be made from glass fibre/carbon spar with glass fibre airfoil shells; whilst the turbine towers will be of tapering tubular steel construction, likely to be finished in a light grey semi-matt colour.
- 4.8 A transformer will be required for each turbine which is assumed to be located within the turbines.
- 4.9 Due to the MOD's requirements for aviation lighting, the proposed development will be fitted with flashing 25 candela red lights on the nacelles of the cardinal turbines of the scheme (turbines 1, 7, 9 and 15). As outlined in Appendix 1 of the MOD Obstruction Lighting Guidance the full 25 candela brightness of these lights is only experienced at viewing angles above the horizontal (upwards overspill). Downwards overspill is to be minimised such that the red light intensity is no more than 10% of the intensity at 0° (2.5 candela).

Turbine Foundations and Crane Hardstandings

- 4.10 The turbines will be installed on foundations comprising both stone and steel-reinforced concrete. These typically measure up to approximately 20m diameter with a concrete depth of approximately 3m to 5m and overlay of depth approximately 0.2m dressed back with topsoil to allow re-vegetation (see Figure 4.3). Each turbine foundation will require approximately 350m³ of concrete. The detailed design, sizing and specification for each foundation will depend on the final turbine selected and the ground conditions encountered at each turbine location.
- 4.11 Adjacent to each turbine, an area of hardstanding approximately 35m x 40m will be constructed for use as a crane pad. The exact geometry and position of the crane pads will depend on the turbine supplier's specifications, the crane selected for erection and the findings of detailed ground investigations prior to construction. The hardstanding areas will be levelled using cut and fill operations and surfaced in crushed stone to provide a durable surface. These hardstandings are used during the erection process as a platform for the cranes to lift the turbine components into position. The hardstanding provides safe access for maintenance and repairs and will therefore remain in place for the operation of the wind farm. An indicative crane hardstanding arrangement is shown in Figure 4.4.

Cables

- 4.12 Approximately 8.3km of cable trenches will be required for the 33kV cabling that will connect the turbines to the control building. Typical cable trench details are shown in Figure 4.6.

Control Building and Substation Compound

- 4.13 A substation and control building compound measuring 150m x 100m is proposed in the north of the site at NGR 297802 844325. The substation compound would contain a 33kV/275kV step-up transformer, associated switchgear and ancillary equipment. The control building required at the sub-station would accommodate metering equipment, switchgear, the central computer

system and electrical control panels. Details of the typical layout are shown in Figure 4.9 and details of typical elevations are shown in Figure 4.10.

Battery Storage Compound

- 4.14 To match onsite energy generation to energy demand, as well as facilitate options such as a reduction in any possible grid constraint requirements, the proposed development also provides for the provision of an energy storage device. Permanent containers, mounted on small concrete pad foundations would house an energy storage device, inverters and other ancillary equipment. The proposed design is a compact and low-key containerised scheme within the retained construction compound adjacent to the substation. For each container there would be a transformer located on the hardstanding. The battery storage capacity will be approximately 20MWh, and the building exterior will be finished in a recessive colour matching that of the substation with both to be agreed with THC. Outline layouts and elevations can be shown in Figure 4.13, 4.14 and 4.15.

Grid Connection

- 4.15 The expected point of connection for the proposed development into the electricity grid system is within the substation compound located adjacent to an existing 275kV transmission overhead line which crosses the site. The exact arrangements of this connection is subject to detailed design by Scottish Hydro Electric Transmission Ltd.
- 4.16 The final grid connection will be offered by the District Network Operator (DNO) through National Grid and the Applicant will have no absolute control over the nature and location of the eventual grid connection. The optimum interconnection point depends upon power flows and available capacity in the wider network; given that these are constantly changing, particularly at the current time with the widespread development of renewable energy projects, it is impossible to guarantee the detail of the grid connection until the time at which the connection is secured for construction.
- 4.17 Should further detailed studies determine that a connection to the local distribution network should prove more suitable, the proposed development would most likely be connected at Nairn Grid Supply Point, a substation located on Granny Barbour's Road to the southwest of Nairn. The connection would be comprised of buried 33 kV cables and/or overhead lines Whilst final route and associated consents would be the responsibility of the DNO, Figure 4.18 shows an outline grid connection corridor has been identified which is centred around the A939 public road. This route would be further studied to inform the final route determined by the DNO and would be subject to a separate consenting process and EIA if required.

Temporary Construction Compound

- 4.18 Two temporary construction compounds and storage area will be installed to provide a secure area for site office facilities and storage of materials and components. Compound 1 will be constructed at approximately NGR 297096 842766, adjacent to the site track close to the site entrance. Compound 2 will be constructed at approximately NGR 297839 844218, adjacent to

the site track and next to the substation compound. Both temporary construction compounds will be constructed with a 50m x 80m hardcore base.

- 4.19 The temporary construction compounds will be used to accommodate a number of construction facilities including site offices and meeting rooms, staff welfare facilities, storage and laydown areas for construction vehicles, plant, equipment, turbine components, other materials and aggregate recycling. The compound will also provide sufficient parking for the contractor's workforce, deliveries and visitors.
- 4.20 There will be a sealed bunded area where fuel and oil storage tanks will be situated, to prevent potential contamination in accordance with a Pollution Prevention Plan (PPP) and SEPA guidance documents PPG 7: The Safe Operation of Refuelling Facilities² and GPP 8: Safe Storage and Disposal of Used Oils³. The bunded area will be situated a minimum of 50m from any watercourse to reduce the risk of pollution entering watercourses. Any contaminated run-off within the sealed bund will be removed to a suitably licensed waste management facility.
- 4.21 At the end of the construction phase the hardcore base will be covered over and allowed to re-vegetate or retained as a location for battery storage if required. A typical construction compound layout is illustrated on Figure 4.7.

Borrow Pit and Concrete Requirements

- 4.22 A borrow pit is proposed as a potential source of site won rock for use primarily in the construction of new tracks and hardstandings. The location of the borrow pit area of search is shown on Figure 4.1. This area of search is shown as the maximum potential area of borrow pit extraction, but it is not anticipated that this area would be fully exploited. The general arrangement of the borrow pit is shown in greater detail in Figure 4.12.
- 4.23 The volume of concrete required for the construction of the turbine foundations is estimated to be 350m³ per turbine (5,600m³ for 16 turbines).
- 4.24 To minimise traffic generation and to maximise working time for the material, the concrete required for the turbine foundations will be batched on site using materials won from the onsite borrow pits as far as possible. The batching plant would be approximately 50m x 80m in size with concrete batching equipment installed. An indicative plan of the concrete batching plant is shown on Figure 4.5. When construction operations are complete, the concrete batching plant would be removed and the hardstanding area reinstated.
- 4.25 It is intended that a borehole be sunk to provide water for the batching plant. The viability of this will be established through detailed ground investigation prior to construction, and any such abstraction will be carried out in accordance with the Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended) (CAR Regulations).

Site Access from the Public Road

- 4.26 The site entrance location was identified as part of the route selection and chosen to minimise disruption, maximise safety and help facilitate delivery. The proposed site entrance is off the A939 at approximately 296938, 843031, and takes the form of a simple give-way priority junction. A plan showing the proposed arrangement is shown on Figure 4.11.
- 4.27 The delivery of the Abnormal Indivisible Loads (AILs) only will be from the Port of Inverness and will head north along Longman Drive and Stadium Road before joining the A9 travelling southeast. The AILs will join the A95 at Granish and continue northeast towards Dulnain Bridge where they will exit onto the A938 proceeding west. AILs will exit the A938 onto the B9007 travelling north before joining the A939, via a new access track to be located in Ferness Field (see Figure 10.3 in Chapter 10: Traffic and Transport, and travelling south before exiting at the proposed site entrance on the A939).
- 4.28 Non AIL construction traffic will from Nairn and the surrounding areas via the A939 to the site entrance. No general construction traffic will be permitted to access the site via the B9007.

Onsite Access Tracks

- 4.29 Approximately 8.3km of newly constructed track will be built for the proposed development as shown in Figure 4.1. The tracks will be constructed to have a nominal running width of approximately 4m with local widening on corners and will be surfaced with coarse aggregate. Adjacent to this track will be a 0.25m wide verge at either side (4.5m track width in total) for cabling and drainage, subject to local ground conditions. There are nine passing places which will measure 2m x 70m. Three turning heads will be installed; one on the spur to T2 measuring 30m x 4.5m with a turning radius of 22m, one between T6 and T8 measuring 70m x 4.5m, and one on the spur to T12 measuring 70m x 4.5m, both with a turning radius of 45m.

Track Design

- 4.30 Whilst the position of the turbines inherently influences the route of the access tracks, the following objectives were adopted during the track design where possible:
- to facilitate safe access to each turbine, ground with potential instability and deeper areas of peat has been avoided where practical;
 - to build health and safety aspects into track design from as early a stage as possible, including avoiding slopes which are too steep for access and creating clear definitions between turbine working areas and access tracks;
 - to minimise watercourse crossings, which has resulted in no watercourse crossings being required as part of the design; and
 - to keep overall new track length to a minimum, reducing stone requirements and associated potential environmental effects.

² <https://www.netregs.org.uk/media/1673/ppg-7.pdf>

³ <https://www.netregs.org.uk/media/1435/gpp-8-v3-swni.pdf>

4.31 Where the track is required to cross an area of peat and topsoil greater than 1m thick over an appreciable distance, a 'floating track' construction would be used where practicable. Floated tracks will be informed by final track design. Figure 4.8 shows typical cut and floating access track details.

Watercourse Crossings

4.32 As noted above, there are no watercourse crossings required for the construction or operation of the proposed development.

Forestry

4.33 There are four areas classified as woodland on the site; two small patches of semi-natural broadleaved woodland and two coniferous plantations.

4.34 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.

4.35 There is a rectangular area of coniferous plantation in the northwest of the site which is exclusively Scots pine *Pinus sylvestris*, and a further area of coniferous plantation in the north east of the site, which is also exclusively Scots pine *Pinus sylvestris*. 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.

4.36 As part of the proposed development, some felling and replanting of woodland and scattered trees is proposed. This is required to accommodate construction of the proposed development, to mitigate potential effects on bats by provision of a standoff distance of 80m between turbines and woodland/scattered tree edges as recommended in Chapter 7: Ecology, and to comply with the requirements of wind turbine manufacturer warranties. These requirements are detailed below and are illustrated on Figure 4.17.

4.37 It would be necessary to fell an estimated 0.27ha of scattered and small groups of trees to accommodate the proposed infrastructure and bat stand-off buffer. The trees which are required to be felled 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. The total amount of new planting at the substation and site entrance combined is approximately 1.4ha and the location of the replanting is shown on Figure 4.17. 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 Removal⁴. Tree felling would be undertaken in accordance with the Forest and Water Guidelines⁵.

4.38 The effects of the tree felling and replanting are assessed in Chapter 5: Landscape and Visual Impact Assessment, Chapter 7: Ecology, Chapter 8: Ornithology, Chapter 9: Hydrology, Hydrogeology, Geology and Peat and Appendix 9.5: Carbon Balance Assessment.

Land Take

4.39 Table 4.2 below provides a summary of temporary and permanent land take for the components of the proposed development.

Table 4.2: Cairn Duhie Temporary & Permanent Land Take

Wind Farm Element	Temporary Hardstanding	Permanent Hardstanding
Construction Compound*	4,000m ²	4,000m ² 346.4m ² per turbine = 5,543m ²
Battery Storage Compound*	N/A	
Turbines	N/A	
Crane Pads and laydown areas	630m ² per turbine = 10,080m ²	1200m ² per turbine = 19,200m ²
Substation and Control Building	N/A	15,500m ²
Onsite access tracks (New)	N/A	8,320m x 4.5m = 37,440m ²
Onsite access tracks (Turning Head)	N/A	(1,230m ² * 2) + 360m ² = 2,820m ²
Onsite access tracks (Passing Place)	7 x 273m ² = 1,911m ²	2 x 273m ² = 546m ²
Permanent Communications Mast and Crane Pad	18m ²	9m ²
Total Hardstanding in Square metres	16,009m ²	85,058m ²
Total Hardstanding in Hectares (ha)	1.6 ha	8.51 ha
Total Hardstanding as % of Total Area within the Wind Farm Site Boundary (6,660,000m ²).	0.24%	1.28%
<i>*One of the two temporary construction compounds will be repurposed as the permanent battery storage compound.</i>		

Micrositing

4.40 It is proposed that the turbines and other infrastructure will be subject to a 50m micro-siting allowance which will be applied should difficult ground conditions be encountered during pre-construction ground investigations, or where more optimal ground conditions are available. Movement of infrastructure will, however, be dependent on other onsite constraints and subject to advice from an Ecological Clerk of Works (ECoW). The micrositing allowance will

⁴ Forestry Commission Scotland (February 2009): The Scottish Government's Policy on the Control of Woodland Removal.

⁵ Forestry Commission (2011) Forests and Water: UK Standard Forestry Guidelines

ensure that the final position of the turbines and associated infrastructure are not varied to such an extent that this would result in a notable change in the predicted environmental effects outlined in the EIA Report. Beyond this distance, any relocation of components will require either written approval from The Highland Council (THC) in consultation with statutory consultees or will be treated as a formal variation to the application.

Construction Details

4.41 Construction of the proposed development will consist of the following key activities:

- tree felling;
- construction of two new temporary construction compounds;
- extracting stone from borrow pit;
- the creation of site access tracks, including passing places, turning heads, junctions and drainage;
- construction of the new control building and substation compound;
- construction of the new battery storage compound;
- construction of turbine foundations;
- construction of crane hardstandings and laydown/storage adjacent to each turbine;
- excavation of trenches and laying of electrical and control cables adjacent to the access tracks connecting the turbines to the control building;
- delivery and erection of wind turbines;
- testing and commissioning of site equipment including wind turbines; and
- site restoration (including tree replanting).

Working of Borrow Pit

- 4.42 Excavation of material from the borrow pit will be carried out using standard quarrying techniques, which may include blasting and mechanical excavation.
- 4.43 The daily operation and management of the borrow pits will be the joint responsibility of the Applicant and the contractor. The general methodology set out below for careful management of the borrow pit will be adhered to in order to minimise potential environmental impact.
- 4.44 A Borrow Pit Method Statement will be agreed with SEPA and THC prior to the commencement of construction. Provisions for the control of surface run-off during and post construction (SuDs) and the re-vegetating of working faces post construction will be included.
- 4.45 As a worst case, it is anticipated that blasting may occur up to 2-5 times a week for the first six months, before tapering off and becoming less frequent.
- 4.46 Appropriate dust suppression at the borrow pits and any materials storage areas will be provided as required.

4.47 Once operations are sufficiently underway, restoration will take place progressively behind the working area to encourage re-vegetation. This will minimise any impact to the surrounding environment by minimising the working area at any point.

4.48 An Outline Borrow Pit Management Plan is provided as Appendix 4.1.

Construction of Temporary Construction Compound

4.49 The construction compound will be formed by stripping organic and soft surface material and laying geotextile and crushed rock to create a firm regular surface. Perimeter drainage will intercept rainfall and then channel water to temporary filtration and dispersion structures, utilising where possible the natural contours of the landscape. The stripped surface material will be stockpiled nearby for reinstatement.

Construction of Tracks

4.50 The vast majority of track will be excavated however it is considered likely that short lengths of floating track will be required at some locations on the site due to the presence of deeper peat. An example of a cut and floating track is shown in Figure 4.8.

4.51 In areas where the peat and topsoil are consistently less than 1m thick, the vegetation and soil would typically be stripped to a suitable subsoil layer. This excavation would include a cut slope. The cut batter would have an angle of 30° where peat is deeper than 1m, and the track cannot be floated. Where peat is 1m or less a batter of 45° will be used, designed to hold a peat turf following re-instatement. The track (approximately 300-500mm thick) would be constructed on the subsoil. The upper topsoil layer, together with turf, would be stored separately from the rest of the subsoil in piles adjacent to, or near to, the tracks, where appropriate, for later reinstatement.

4.52 Once the soil has been removed to a suitable founding layer, the track and running surface would be constructed by tipping and compacting stone to the required shape and thickness. Cross-sections of the final track shape can be seen in Figure 4.8.

4.53 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 'typical cross-slope cut track section' in Figure 4.8 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 'typical cut track section'.

4.54 In the event that a track is required to cross an area of peat and topsoil greater than 1m 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 geotextile by laying and compacting crushed rock up to a thickness of approximately 500-1000mm, the exact depth being dependant on ground conditions (see Figure 4.8). 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.

- 4.55 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 4.8.

Construction of Control Building and Substation Compound and Battery Storage Compound

- 4.56 The hardstandings of each of the new compounds will be constructed from site-won rock, with a close bound granular capping to act as a running surface to delivery and support staff vehicles etc. The hardstanding will be graded to provide drainage falls. This finish provides a free-draining granular running surface through which rain water can permeate and/or be conveyed to the edge of the hardstanding, where it will be intercepted by a cut off ditch/linear soakaway that will convey any remaining flows to a soakaway. Indicative plans are provided in Figure 4.9 and elevations are shown in Figure 4.10.

Construction of Turbine Foundation and Hardstandings

- 4.57 Construction of turbine bases, hardstandings and laydown/storage areas will require the excavation of surface organic and soft surface material through to underlying rock. This excavated material may be used to partially backfill the excavation and provide material for landscaping and surfacing reinstatement. As such, this material will be stored near to the excavation until required. The underlying rock will be levelled to provide a workable platform for the assembly of reinforcing bars and formwork used to contain the poured concrete.
- 4.58 During construction, dewatering may be required to keep the construction area dry (for example, if rainwater gets into construction areas). Suitable filtration systems will be employed to ensure that silt laden water does not contaminate surface watercourses and that extracted water is returned to the surrounding area with a limited effect on local hydrology.
- 4.59 Indicative turbine foundations and hardstandings are shown in Figures 4.3 and 4.4.

Installation of Cabling

- 4.60 The cabling connecting each turbine to the control building will be laid in a trefoil arrangement. Detailed construction and trenching specifications will depend on ground conditions encountered. Typically, cables will be laid in a trench 1m deep and 1.5m wide (see Figure 4.6). To minimise ground disturbance cables will be routed along the side of the access tracks where practicable.
- 4.61 Cables will be laid within a sand or granular bedding to prevent damage to the cables from sharp stones. Trenches will be backfilled with excavated material and the surface redressed.

Erection of Turbines

- 4.62 The erection process for each turbine will take approximately two to three days, although this will depend on weather conditions, as generally, turbines are erected in wind speeds not exceeding 8 to 10m/s for health and safety reasons.

Construction Lighting

- 4.63 Depending on the time of year and the stage of the construction programme, temporary lighting may be required at the temporary compounds and substation during working hours. It is not proposed that the lighting will be on outside of working hours.

Construction Programme

- 4.64 Construction of the proposed development is estimated to last 15 months. An indicative programme for the construction activities of the proposed development is shown in Table 4.2 below.

Table 4.3: Indicative Construction Programme

TASK	CONSTRUCTION MONTH														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Site set-up															
Site tracks & hard standings															
Substation and control building															
Foundation construction															
Cable installation															
Turbine erection, commissioning & testing															
Reinstatement															
Site demobilisation															
Miscellaneous															

- 4.65 Many of the construction activities will be carried out concurrently, although predominantly in the order identified, reducing the overall length of the construction programme. Site restoration will be programmed and carried out to allow the restoration of disturbed areas as early as possible and in a progressive manner. An ECoW will be onsite during construction in certain areas/months to be agreed with The Highland Council.

Working Hours

- 4.66 In general, working hours for construction will be from 07.00 to 19.00 Monday to Friday and 07.00 to 12.00 on Saturday. No working is proposed on Sundays and public holidays.

4.67 Exceptions to the proposed working hours will be made for foundation pours and turbine erection. Concrete pouring for an individual turbine foundation must take place continuously and so activity will only cease when the pour has been completed. Turbine erection can only occur during periods of low wind speeds and so to minimise the construction programme, lifting operations may need to be scheduled out with the above hours. In addition, it may be necessary to complete a particular lifting operation to ensure the structure is left safe.

Reinstatement

General Approach

4.68 Following construction, the site will be reinstated by the contractor. The anticipated type and extent of reinstatement is outlined below.

4.69 Where a re-turfing method is appropriate, such as along track verges, the surface layer of soil and vegetation will be stripped and stored separately from the lower soil layers, and replaced as intact as possible once construction is complete.

4.70 Local restoration will be carried out to retain the structure and composition of the original plant communities, as well as forming a stable area over reformed ground, thus reducing erosion by rain, run-off and wind.

4.71 Bare soil areas will be allowed to re-vegetate naturally in combination with reseeded using a low density (~20kg per hectare) seed mix which mirrors local vegetation to help bind the soil more quickly.

Site Tracks

4.72 Site tracks are required throughout the operational of the wind farm to permit access for maintenance and repair operations. They will also be necessary to allow access during the decommissioning stage.

4.73 Generally, the sloping verges of access tracks will be dressed with site sourced turf or seed bank material. If suitable material is generated during the construction of the track, this material can be used to form a low lying screening verge along the downhill side of the track, to be dressed as per the track verges. This will assist in reducing the visibility of the track.

Turbine Bases and Hardstanding

4.74 Turbine foundations, hardstanding and laydown/storage areas will be capped with a minimum of 150mm of soil material, which may form a raised mound between 300mm and 500mm above the existing ground level. These will be re-turfed with the removed material, but where vegetation is sparse or unlikely to regenerate, reseeded with an appropriate local seed mix may be undertaken as outlined above.

4.75 The condition of turfs will be monitored regularly during the first two months following reinstatement. If necessary, water will be imported to the site to ensure the re-establishment of this vegetation.

4.76 Hardstanding and laydown/storage areas at each turbine location will be retained for use during operation and decommissioning, however the edges will as far as possible be blended to the adjacent contours and natural vegetation allowed to re-establish.

Construction Compound

4.77 The temporary construction compound will be reinstated into the surrounding landscape and restored to its original condition.

Environmental Management

4.78 Construction Method Statements and a CDEMP will be prepared prior to the start of construction, detailing measures to avoid or mitigate potential effects associated with key construction activities. These will reflect and expand upon measures identified in the EIA Report, and will be agreed with The Highland Council, SEPA, SNH⁶ and other stakeholders where appropriate. An outline CDEMP is provided as Appendix 4.2.

4.79 The purpose of the CDEMP is to:

- Provide a mechanism for ensuring that construction methods avoid, minimise and control potentially adverse significant environmental effects, as identified in the EIA Report.
- Ensure that good construction practices are adopted and maintained throughout the construction of the proposed development.
- Provide a framework for mitigating unexpected effects during construction.
- Provide assurance to third parties that agreed environmental performance criteria are met.
- Establish procedures for ensuring compliance with environmental legislation and statutory consents.
- Detail the process for monitoring and auditing environmental performance.

4.80 The CDEMP will be updated when necessary to account for changes or updates to legislation and good practice methods throughout the construction phase. The CDEMP will also be amended to incorporate information obtained during detailed ground investigations which will be undertaken post consent and prior to construction activities. Compliance with the CDEMP (including procedures, record keeping, monitoring and auditing) will be overseen by a suitably qualified and experienced ECoW.

4.81 The CDEMP will contain the following documents, which the Principal Contractor and their sub-contractors will be required to adhere to throughout the construction process:

⁶ Scottish Natural Heritage (SNH) changed its name to NatureScot at the end of August 2020; due to the timescales in which the Cairn Duhie EIA Report was drafted, these terms are used interchangeably within this chapter

- A Pollution Prevention Plan (PPP);
- Construction Method Statements (CMS);
- A Peat Management Plan (PMP) (following the principles set out in the draft PMP provided as Appendix 4.3);
- A Site Waste Management Plan (SWMP);
- A Site Restoration Plan; and
- A Decommissioning Plan.

4.82 The CDEMP will also contain the following information:

- The name, qualifications and CV of the nominated person(s) with the responsibility for all environmental matters, for approval.
- A completed register of contacts confirming the contact details for all key personnel for managing environmental issues, including the Applicant's representatives, the ECoW, Principal Contractor contacts and appropriate regulator contacts.
- The construction programme and detailed working method statements.
- A site-specific action plan, providing a register of environmental risks and outlining the requirement for accompanying site-specific mitigation, monitoring and reporting procedures.
- Audit and inspection procedures.

4.83 The CDEMP and associated plans will be submitted to The Highland Council, and others as appropriate, prior to the commencement of works. A copy of the CDEMP will be kept in the construction site office for the duration of the works and will be available for review at all times.

4.84 The Principal Contractor will be responsible for the continual development of the CDEMP to take account of monitoring and audit results during the construction phase and changing environmental conditions and regulations.

4.85 The services of other specialist advisers will be retained as appropriate, to be called on as required to advise on specific environmental issues.

4.86 Performance against these documents will be monitored by the Applicant's Construction Project Manager and the ECoW throughout the construction period. They will ensure that the works carried out are in accordance with the relevant best practice guidance documents. The outline CDEMP provided as Appendix 4.2 contains an outline of the content which, at this time, would be expected to be included within the final CDEMP, which will be agreed subject to an appropriately worded consent condition.

Embedded Mitigation Measures

4.87 Good practice measures will be employed as standard techniques during the construction and operation of the proposed development. Therefore, these are considered to be an integral part of the design, construction and operation of the proposed development. This is considered a realistic scenario given the current regulatory context and accepted good practice across the industry.

4.88 Good practice measures will include (but are not limited to) measures associated with:

- pollution incidents;
- erosion and sedimentation;
- modification of surface water drainage patterns;
- modification of groundwater levels and flows;
- compaction of soils; and
- peat stability.

4.89 The good practice embedded mitigation measures will be incorporated into the CDEMP and further details are presented in Appendix 4.2.

Soil and Peat Management

4.90 Whilst the proposed development has been designed to minimise disturbance to peatland, it has not been possible to avoid areas of peatland entirely. Consequently, a draft Peat Management Plan (PMP) is presented at Appendix 4.3 and includes the following information:

- an estimation of the volume of soil and peat likely to be excavated during construction;
- identification of opportunities to minimise excavation volumes;
- options for onsite reuse of excavated material; and
- good practice methods to be employed in relation to handling and storage of excavated soil and peat.

4.91 Adherence to the PMP will ensure that excavated soil and peat is appropriately managed and re-used onsite. It is anticipated that all excavated peat can be reused for reinstatement of ground, at both the point of excavation as well as in the landscaping of track shoulders and hardstandings. Prior to construction and on completion of ground investigations and micro-siting, the PMP will be refined and agreed with SEPA and SNH.

4.92 In accordance with Scottish Government Guidance, the proposed development has been designed to avoid peat landslide hazard. A Peat Landslide Hazard and Risk Assessment has been carried out and a copy of the report is included at Appendix 9.2, with further information also provided in Chapter 9: Hydrology, Hydrogeology, Geology and Peat.

Waste Management

4.93 Materials will be generated, and will require management, during construction, in particular the topsoil removed and stockpiled prior to construction area activities, and construction waste such as packaging materials.

4.94 Measures to reduce potential environmental effects associated with the storage and transportation of waste will include:

- the careful location of stockpiles and other storage areas;
- the use of good practice in the design of storage areas and the use of suitable containers;
- the use of sheeting, screening, and damping where appropriate and practicable;
- the control and treatment of runoff from soil and soil stockpiles;
- minimising storage periods; and

- minimising haulage distances.
- 4.95 All materials will be identified, classified, quantified and, where practicable, appropriately segregated. Any materials that cannot be reused will be disposed of according to relevant waste management legislation which will serve to address a number of possible environmental effects. This includes:
- the Duty of Care imposed by Section 34 of the Environmental Protection Act 1990; and
 - the Waste Management Licensing Regulations 1994 (as amended), particularly provisions relating to registered exemptions from waste management licensing.
- 4.96 All materials removed from site will be handled in accordance with relevant waste and environmental regulations. Waste will be transferred using a registered waste carrier to a licensed waste disposal site or recycling centre.

Health and Safety

- 4.97 All construction activities will be managed within the requirements of the Construction (Design and Management) Regulations 2015 and will not conflict with the Health and Safety at Work etc. Act 1974. The design of the proposed development has taken full account of these regulations. To further reduce possible health and safety risks, a Health and Safety Plan for the project will also be drawn up. All staff and contractors working on the construction will be required to comply with the safety procedures and work instructions outlined in the Plan at all times.
- 4.98 To ensure that hazards are appropriately managed, risk assessments will be undertaken for all major construction activities, with measures put in place to manage any hazards identified.
- 4.99 The Construction (Design and Management) Regulations 2015 have formed an integral part of the design of the proposed development and the resulting layout presented within the EIA Report. Potential health and safety risks have been taken account of and consideration reflected in a site wide Designers risk assessment. Surveys and investigations have been undertaken throughout the design of the proposed development to identify, manage and if possible avoid any potential risks during construction as far as possible. These will require on-going review throughout the proposed construction period, in line with current regulation.

Ice Throw

- 4.100 In certain weather conditions, one potential hazard relates to ice forming on turbine blades. This may result in ice fragments being thrown from the rotor when operating and in ice falling from the rotor when shut down. The Scottish Government web based renewables advice for onshore wind turbines states *“The build-up of ice on turbine blades is unlikely to present problems on the majority of sites. When icing occurs, the turbines’ own vibration sensors are likely to detect the imbalance and inhibit the operation of the machines”*. In addition, the operator will implement measures to ensure the safety of workers and the general public in relation to ice throw and ice fall.

- 4.101 The design of the proposed development has taken into account the possibility of ice throw occurring and turbines have been sited in locations to ensure that the rotor blades do not oversail any public roads to minimise the risk from ice fall. The low risk of ice throw is further minimised by the turbine’s vibration sensors (or other ice detection measures) which detect any imbalance which might be caused by icing. The turbines which are affected by icing will be temporarily shut down until normal balance is restored. Operational procedures will also be put in place to ensure the safety of both workers and the public in relation to ice throw and ice fall. Procedures will include turbine shutdown and warning signage.

Operational Details

- 4.102 The proposed development has been designed to have an operational lifespan of up to 35 years.
- 4.103 Once operational, the site will not be permanently manned, and it is envisaged that the amount of traffic associated with the proposed development will be minimal. Traffic generated will comprise routine service and maintenance team visits, together with the occasional need for more extensive maintenance or repair. Wind turbine operations will be overseen by suitably qualified contractors.
- 4.104 Routine maintenance and servicing will take place two to four times per year. Servicing will include the performance of tasks such adjustment of blades, inspection of blade tip brakes and inspection of welds in the tower. Other visits to the site will take place more frequently to ensure that the turbines are operating at their maximum efficiency. In the event of any unexpected events onsite appropriate repair works will be carried out.
- 4.105 The vehicle used for the majority of these visits is likely to be a small four wheel drive vehicle, although there may be an occasional need for an HGV or crane to access the site for heavier maintenance and repairs.
- 4.106 On-going track maintenance will generally be undertaken in the summer months when tracks are dry. Safe access will be maintained all year round.

Decommissioning

- 4.107 The operational lifespan of the proposed development and associated infrastructure will be 35 years. Following this, an application may be submitted to retain or replace the turbines, or they could be decommissioned. Decommissioning will involve the following:
- dismantling and removal of wind turbines and electrical equipment;
 - restoration of the turbine areas, hardstandings and tracks; and
 - demolition and removal of the substation and battery storage compounds.
- 4.108 Turbine components and electrical equipment will be dismantled and removed in a similar fashion to their delivery and erection. The turbines will be split into sections which will then be transported from the site by HGVs unless the components are sold on, in which case, they

will be removed as abnormal loads. Turbine components will be cut up offsite in controlled environments ready for reuse, recycling or appropriate disposal.

- 4.109 The removal of the top of the turbine base will be undertaken requiring an excavated trench around the upstand to provide a working area. Breakout of the top part of the plinth will be undertaken using an excavator mounted jack hammer. The cables will be cut level with the remaining concrete. Once the broken-out concrete has been removed, the area will be reinstated by backfilling with soil/peat to an agreed method statement, as outlined in the restoration section above.
- 4.110 The cables will be left in place to avoid unnecessary ground disturbance.
- 4.111 The CDEMP will be updated as required to ensure best practice is adopted during decommissioning of the proposed development.
- 4.112 An assessment of the decommissioning of the proposed development has not been undertaken as part of the EIA as: i) the future baseline conditions (environmental and other developments) cannot be predicted accurately at this stage and ii) the proposals for refurbishment / decommissioning are not known at this stage.

Chapter 5: Landscape and Visual Impact Assessment

5. Landscape and Visual Impact Assessment

Introduction

- 5.1 The Landscape and Visual Impact Assessment (LVIA) considers the potential effects of the proposed development on the landscape and visual resources of the site and the surrounding study area, during the construction, operational and decommissioning phases of the project.
- 5.2 Landscape character and resources are considered to be of importance in their own right and are valued regardless of whether they are seen by people. Effects on views and visual amenity as perceived by people are clearly distinguished from, although closely linked to, effects on landscape character and resources. Landscape and visual assessments are therefore separate, although linked, processes.
- 5.3 The assessment methodology for the LVIA has been developed in accordance with the Guidelines for Landscape and Visual Impact Assessment (Version 3, 2013) (GLVIA3), and is detailed in Appendix 5.1. The assessment has been undertaken by chartered Landscape Architects at LUC.
- 5.4 This chapter should be read in conjunction with the following chapters:
- Chapter 3: Design;
 - Chapter 4: Development Description;
 - Chapter 6: Cultural Heritage;
 - Chapter 7: Ecology; and
 - Chapter 12: Socio-Economics
- 5.5 This chapter is supported by LVIA figures contained in this Volume, LVIA Visualisations in Volume 2 and 3 (to NatureScot and The Highland Council standards respectively) and the following Appendices:
- Appendix 5.1: LVIA and Visualisation Methodology;
 - Appendix 5.2: Cairngorms National Park Special Landscape Qualities Assessment
 - Appendix 5.3: Residential Visual Amenity Assessment; and
 - Appendix 5.4: Aviation Lighting Night-time Assessment
- 5.6 The study area for the assessment was defined as 40km from the outermost turbines of the proposed development in all directions, as recommended in current guidance for turbines between 131-150m to blade tip¹, and in agreement with statutory consultees NatureScot (herein referred to as SNH²), The Highland Council (THC), Moray Council and the Cairngorms National Park Authority (CNPA). The site is shown on Figure 1.1: Site Location and the study area is shown on Figure 5.1.1: Landscape and Visual Impact Assessment Study Area.

- 5.7 To consider cumulative effects of the proposed development in relation to other schemes in the wider area, wind farms within 40km of the proposed development have been included. They are modelled within visualisations and examined in the 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 40km, following guidance from SNH³.

Scope of Assessment

Effects Assessed in Full

- 5.8 The following effects have been assessed in full:
- Direct effects on the physical landscape of the site, during construction, operation and decommissioning;
 - Indirect effects on landscape character within the wider study area (within 15km) during operation;
 - Indirect effects on the key characteristics and special qualities of designated landscapes (within 15km) during operation, including the overall integrity of the designated landscape as required by Scottish Planning Policy (SPP)⁴;
 - Effects on visual amenity relating to changes in views experienced by people from representative viewpoints within 40km, during operation;
 - Effects on visual amenity relating to changes in views experienced by people from nearby settlements (within 15km) and routes (within 15km), during operation;
 - Effects on landscape and visual receptors relating to the interaction between the proposed development and other existing or proposed wind farms (cumulative effects), during operation; and
 - Landscape and visual effects at night-time due to the requirement for aviation lighting, during operation.
- 5.9 In accordance with the EIA Regulations, the key objective of the assessment is to identify, describe and assess the likely significant landscape and visual effects of the proposed development.

Effects Scoped Out

- 5.10 On the basis of the desk based and field work undertaken, the professional judgement and experience of the LVIA team and policy guidance or standards, the following effects have been 'scoped out' (in agreement with statutory consultees):
- Effects on receptors beyond 40km from the site, where it is judged that potential significant effects are unlikely to occur;

¹ SNH (February 2017) Visual Representation of Wind Farms Guidance. Version 2.2

² Scottish Natural Heritage (SNH) changed its name to NatureScot at the end of August 2020; due to the timescales in which the Cairn Duhie EIA Report was drafted, these terms are used interchangeably within this chapter.

³ SNH (March 2012) Assessing the Cumulative Impact of Onshore Wind Energy Developments

⁴ The Scottish Government (2014) Scottish Planning Policy

- Locations where receptors are unlikely to be affected by the proposed development, through having minimal or no predicted visibility, as predicted by the ZTV mapping (Figures 5.1.2a and 5.1.3a and Figures 5.1.4b and 5.1.5b);
- Cumulative effects in relation to turbines of less than 50m to blade tip, single turbines beyond 5km and wind farms at design/scoping stage (except where otherwise stated);
- Given their transient nature, landscape effects on LCTs beyond the site boundary, visual effects and cumulative landscape and visual effects during the construction and decommissioning phases; and
- Effects on Wild Land Areas (WLAs) in the study area (WLA 15 Cairngorms and WLA 20 Monadhliath), where it is judged that potential significant effects are unlikely to occur. Where wildness attributes occur outside of WLAs but within the Cairngorms National Park (CNP), these contribute to the Special Landscape Qualities (SLQs) of the park and are considered within the assessment of effects on the CNP.

Assessment Methodology

Overview

- 5.11 The LVIA methodology was prepared in accordance with the principles contained within GLVIA3 and is described in detail in Appendix 5.1.
- 5.12 The key steps in the methodology for assessing both landscape and visual effects are as follows:
- The landscape of the study area was analysed and landscape receptors identified;
 - The area in which the proposed development may be theoretically visible was established through creation of a ZTV map covering a distance of 40km from the proposed turbines;
 - The visual baseline was recorded in terms of the places where people will be affected by views of the proposed development, and the nature of views and visual amenity, seen by different groups of people;
 - Viewpoints were selected (including representative viewpoints, specific viewpoints and illustrative viewpoints), in consultation with SNH, THC, Moray Council and the CNPA;
 - Likely effects on landscape and visual resources were identified; and
 - The significance of landscape and visual effects were judged with reference to the sensitivity of the resource/receptor (its susceptibility and value) and magnitude of change (taking cognisance of the scale of effect, geographical extent, duration and reversibility).

Legislation and Guidance

Legislation

- 5.13 Information relating to relevant international and national legislation is provided in **Chapter 1: Introduction**.

Guidance

- 5.14 The LVIA has been carried out in accordance with, and with reference to the information and principles contained in:

Assessment Guidance

- The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations (2017);
- Landscape Institute and the Institute of Environmental Management and Assessment (2013) Guidelines for Landscape and Visual Impact Assessment, 3rd Edition (GLVIA3);
- SNH (2012) Assessing the cumulative impact of onshore wind energy developments;
- SNH (2018) A Handbook on Environmental Impact Assessment, Appendix 2: Landscape and Visual Impact Assessment, Version 5;
- SNH (2017) Visual Representation of Wind Farms, Version 2.2;
- THC (2016) Visualisation Standards for Wind Energy Developments;
- Landscape Institute (2019) Technical Guidance Note 06/19 Visual representation of development proposals; and
- Landscape Institute (2019) Technical Guidance Note 02/19 Residential Visual Amenity Assessment.

Design and Locational Guidance

- SNH (2017) Siting and Designing Wind Farms in the Landscape, Version 3a;
- SNH (updated 2009) Policy Statement No 02/02: Strategic Locational Guidance for Onshore Windfarms in Respect of the National Heritage;
- SNH (2015) Constructed Tracks in the Scottish Uplands, 2nd Edition;
- SNH (2019) Good Practice During Windfarm Construction, Version 3;
- Scottish Government (2014) Scottish Planning Policy;
- Scottish Government (2017) Scottish Energy Strategy: The Future of Energy in Scotland;
- Scottish Government (2017) Onshore Wind Policy Statement;
- Scottish Government (2003) Planning Advice Note (PAN) 68: Design Statements; and
- SNH (2015) Spatial Planning for Onshore Wind Turbines - Natural Heritage Considerations.

Landscape Character and Designated Landscapes

- Council of Europe (2000) European Landscape Convention;
- SNH (2019) National Landscape Character Assessment;
- Moray Council (2017) Moray Wind Energy Capacity Study, Updated and Revised Final Main Report - Post Consultation;
- SNH (2010) The Special Qualities of the National Scenic Areas. SNH Commissioned Report No.374;
- THC (2011) Assessment of Highland Special Landscape Areas;
- Moray Council (2018) Moray Local Landscape Designation Review, Final Report; and
- Historic Environment Scotland Inventory of Gardens and Designated Landscapes⁵.

⁵ Historic Environment Scotland, <http://portal.historicenvironment.scot/>

Local Development Plans and Supplementary Planning Guidance

- THC (2012) Highland-wide Local Development Plan;
- THC (2015) Inner Moray Firth Local Development Plan;
- THC (2016) Onshore Wind Energy Supplementary Guidance;
- THC (2017) Landscape Sensitivity Appraisal: Black Isle, Surrounding Hills and Moray Firth Coast Caithness, Addendum Supplementary Guidance: 'Part 2b';
- THC (2006) Highland Renewable Energy Strategy and Planning Guidelines; and
- Moray Council (2017) Supplementary Guidance: Moray Onshore Wind Energy.

Consultation

5.15 In undertaking the assessment, consideration has been given to the scoping responses and other consultation undertaken as detailed in Table 7.1 below.

Table 5.1: Consultation Responses

Consultee	Scoping/Other Consultation and Date	Issue Raised	Response/Action
The Highland Council (THC)	Scoping Opinion 27 th March 2020	Separate volumes of visualisations, provided in hard copy, should be prepared to both THC and SNH standards.	The visualisations have been prepared to meet both THC and SNH standards. These are provided in Volume 2 (SNH Visualisations) and Volume 3 (THC Visualisations) .
		All associated elements of the development such as onsite borrow pits and access roads, should be included within the LVIA.	All ancillary development required for construction and operation of the proposed development has been included in the proposals and has been assessed in the EIA Report. Where this is visible from viewpoints within 5km of the proposed development this has also been modelled into the photomontages.
		Residential visual amenity should be included with the assessment.	Potential effects on residential visual amenity are considered in the Residential Visual Amenity Study in Appendix 5.3 .

Consultee	Scoping/Other Consultation and Date	Issue Raised	Response/Action
		The cumulative assessment should be carried out to a study area within a minimum of 35km.	A cumulative assessment has been undertaken, which considers all other wind farm schemes within 40km (as shown on Figure 5.1.6 of the CLVIA).
		It is recommended that the THC Interactive Wind Turbine map and consultation with the ECU should be carried out to identify any other developments which are currently at the scoping stage within the area.	The final list of schemes for inclusion in the cumulative assessment has been agreed with THC, MC and SNH.
		All viewpoints used previously in the 2013 application have been requested, along with three additional viewpoints: <ul style="list-style-type: none"> • Drumguish Croft A939 • Site Entrance A939 • A939 South of Ferness village 	All viewpoint requests made through Scoping were considered, potential visibility was analysed and those deemed suitable for the LVIA were re-consulted upon. Given intervening landform, vegetation limiting visibility, and distance from the site, significant visual effects were considered unlikely from the other requested viewpoints and these were not considered further.
		A list of final viewpoints must be agreed with THC once the number, size and scale of the proposed turbines has been finalised.	Viewpoints agreed through consultation with THC.
		Consideration needs to be given to the proposed development's impact on Wild Land Area (WLA) 15: Cairngorms, through a WLA Assessment, with adequate viewpoints to determine potential impacts. Any viewpoints should be agreed with SNH and THC.	A WLA for WLA 15: Cairngorms was not included as it is considered that significant effects on this WLA are unlikely. Qualities relating to wildness that occur outside WLA 15: Cairngorms contribute to the special landscape qualities of the CNP and

Consultee	Scoping/Other Consultation and Date	Issue Raised	Response/Action
			are therefore considered in the assessment of effects on the CNP, included in Appendix 5.2 .
		Consideration needs to be given to SLAs that have theoretical visibility, the CNP and the Cairngorm NSA.	Designated landscapes are considered in the section on Designated Landscapes .
		The SNH 2019 landscape character assessment should be used.	The SNH 2019 landscape character assessment has been referred to within the LVIA.
		Requested that all core paths, the national cycle network, long distance trails, and the North Coast 500 are assessed.	Core paths, long distance walking routes and National cycle routes are considered in the section on Routes , however given intervening landform, vegetation limiting visibility, and distance from the site, significant visual effects were considered unlikely for some core paths and long-distance trails, some routes within the national cycle network, and the North Coast 500. Table 5.7 details which routes have been taken forward for detailed sequential assessment.
		Assessment of the proposal against the criterion set out in the Council's Onshore Wind Energy Supplementary Guidance (OWESG) to be included in the LVIA.	The OWESG criterion is considered in various sections in throughout the assessment and summarised in the planning statement.
		An assessment of the impacts of the proposal on any landscapes designated at a national and local scale must be included in LVIA, including SLAs using the SLA citations available from the Council's website.	Designated landscapes are considered in the section on Designated Landscapes .
		Residential visual amenity should be assessed within the LVIA.	A Residential Visual Amenity Assessment is provided in Appendix 5.3 .

Consultee	Scoping/Other Consultation and Date	Issue Raised	Response/Action
		Confirmed that the GLVIA 3 is the appropriate methodology for the LVIA.	Noted.
	Email 4 th June 2020	<p>Stated that most of the viewpoints are quite tightly clustered within the 5km radius with a few more distant ones to the south, and therefore suggested the following:</p> <ul style="list-style-type: none"> There is nothing in the Sutors of Cromarty, Rosemarkie and Fort George SLA. Chanonry Point and the North Sutor would be suitable as well visited, promoted viewpoint locations; A viewpoint on the B9007 at around the 10km radius mark would be useful if Lethen Wind Farm progresses and also duplicates a location used for the Clash Gour wind farm in Moray; While Nairn is showing visibility, in practice much of that will be cut out by buildings. For the original application we had a viewpoint on the A96 in the vicinity of Sainsbury's which should be revisited; and The unclassified road around Lochindorb is showing as having potential visibility of up to 6 turbines and should be included as a popular visitor location at the heart of the Drynachan, Lochindorb and Dava Moors SLA. 	All additional viewpoint requests made through consultation were considered, potential visibility was analysed, however given intervening landform, vegetation limiting visibility, and distance from the site, significant visual effects were considered unlikely from these requested viewpoint locations and were therefore not considered further. With regard to the Lochindorb viewpoint request the unclassified minor road is on the fringes on the ZTV and intervening landform limits visibility. A more elevated view from Carn nan Gabhar has been included in the assessment viewpoints.
	Email 28 th July 2020	Confirmed agreement with viewpoint locations for the Aviation Lighting Night-Time Assessment. Highlighted that night-time and dusk visualisations may be required	Noted. SNH (NatureScot) has been consulted with to agree scope of the Aviation Lighting Night-Time Assessment.

Consultee	Scoping/Other Consultation and Date	Issue Raised	Response/Action
		from any WLA that has theoretical visibility and SNH (NatureScot) should be consulted on this.	
SNH (NatureScot)	Scoping Opinion 3 rd April 2020	Confirmed that the GLVIA 3 is the appropriate methodology for the LVIA.	Noted.
		The CNP boundary should be shown clearly on all landscape figures. It is requested that 1:50,000 OS basemap is used for landscape figures so detailed information is legible.	Noted. This is displayed on all landscape figures to the specified basemap scale.
		Highlighted a number of potentially significant effects including on the underlying Open Rolling Uplands LCT due to increased turbine height in the context of a significantly altered cumulative baseline. Other effects anticipated include: <ul style="list-style-type: none"> the location of the proposed development on the northern edge of Open Rolling Uplands upland LCT close to the transition with the Narrow Wooded Valley LCT to the north and by virtue of its scale, seeming to breach the edges of existing distinctive and contrasting LCTs; the altered scale relationship with the underlying local landform of Cairn Duhie which forms one of several distinctive hill features within the area which contribute to the wider experience of SLQs; potential increase in effects on visual receptors, due to the increased height and 	Noted. These potential effects are considered within the sections on Likely Significant Landscape Effects, Likely Significant Visual Effects and Potential Implications for Designated Landscapes.

Consultee	Scoping/Other Consultation and Date	Issue Raised	Response/Action
		<p>alternative layout of the proposed wind turbines;</p> <ul style="list-style-type: none"> the potential for additional significant adverse cumulative effects, particularly in the immediate landscape with Clash Gour, Berry Burn and Hill of Glaschyle wind farms; and the cumulative effects as experienced from the Cromdale Hills (including from the A939) within the CNP. 	
		The size of the study area needs to be clearly justified on the basis of the preliminary findings of the LVIA.	The study area is in line with best practice and is considered appropriate and proportionate to the scale of the proposed development. A 40km study area has been used, in line with SNH guidance for the height of the proposed turbines.
		<p>Representative viewpoints used previously for the 2013 application should be included to allow comparison of effects between the consented development and the proposed development.</p> <p>Three additional viewpoints have been requested:</p> <ul style="list-style-type: none"> Carn a Ghille Chearr A939 near Lynemore Track by Sgor Gaoithe (near northern Huntly's Cave) 	<p>All viewpoint requests made through Scoping were considered, potential visibility was analysed and those deemed suitable for the LVIA were re-consulted upon.</p> <p>Carn a Ghille Chearr has been included as a viewpoint, however, given intervening landform, vegetation limiting visibility, and distance from the site, significant visual effects were considered unlikely from the other requested viewpoints and these were not considered further.</p> <p>The final list of viewpoints has been agreed with SNH.</p>

Consultee	Scoping/Other Consultation and Date	Issue Raised	Response/Action
		Clarity is required on why five of the previous representative viewpoints used for the 2013 application have been omitted.	The final list of viewpoints has been agreed with SNH. To help focus the assessment of significant effects the LVIA has sought to largely scope out viewpoints where significant visual effects, in relation to the consented development and with consideration of the proposed development, are considered unlikely.
		An assessment of effects of the proposal on the Special Landscape Qualities (SLQs) of the CNP should be carried out. Further agreement on the scope and content of this assessment should be agreed with SNH and CNPA, in particular the combination of SLQs to be scoped into the assessment and the spatial extent of the SLQ assessment which can inform the SLQ work.	Potential effects on the CNP are considered within Cairngorms National Park Special Landscape Qualities Assessment in Appendix 5.2 . The scope of the assessment has been agreed with SNH who has consulted with the CNPA.
		Agreed that a Wild Land Assessment of effects can be scoped out.	Noted.
		SNH require clarification as to whether aviation lighting is required for this proposal.	Aviation lighting is proposed following consultation with the Ministry of Defence (MOD) and the Highlands and Islands Airports Limited (HIAL). The effect of aviation lighting is assessed in Appendix 5.4 .
	Consultation Letter 18 th June 2020	SNH reiterate their request that Cairn a Ghille Chearr is included as a viewpoint within the LVIA to assess effects on the SLQ of the CNP. SNH reiterate their request that the A939 near Lynemore is included as a representative viewpoint within the LVIA. SNH consider that potential visibility from Sgor Gaoithe (Huntly's Cave track) is not	Cairn a Ghille Chearr has been included as a viewpoint within the LVIA. After further analysis of visibility from A939 near Lynemore it is apparent that the north-eastern flank of Beinn an Fhudair, in the foreground, foreshortens views, and given the

Consultee	Scoping/Other Consultation and Date	Issue Raised	Response/Action
		limited in extent, and request that it is included as a formal viewpoint in the LVIA.	viewing distance (over 20km); fleeting and sequential nature of this view; and role that the landform plays in obscuring the proposed development it has been concluded that it does not merit a formal assessment viewpoint. However, a wireframe has been included as a cumulative wireframe to support the CNP SLQ assessment and sequential assessment from the A939 in the LVIA. After further analysis of visibility from Sgor Gaoithe (Huntly's Cave track), it is concluded that the rising landform to the north of the cave screens views from the track near the cave entrance, and, as recreational receptors move north along this track, visibility does not open out until the point just north of the CNP boundary. Given this represents a short lived, sequential view from a hill track outside the CNP it is concluded that it does not merit a formal assessment viewpoint, however a wireframe has been included as a cumulative wireframe in the LVIA to support the SLQ assessment.
		The focused approach to cumulative assessment of effects should also include Tom nan Clach, as the introduction of taller turbines at Cairn Duhie is likely to increase the contribution that this proposal makes to reducing the separation experienced at Dava and from the fringes of the CNP between wind energy	Noted. Tom nan Clach has been included within the cumulative assessment. Professional judgement has been applied to determine which landscape and visual receptors are taken

Consultee	Scoping/Other Consultation and Date	Issue Raised	Response/Action
		development in Moray and Highland. SNH does not accept that receptors for which 'a low magnitude of change (in relation to the proposed wind farm) is identified...within the primary LVIA' can be scoped out of the cumulative assessment. This is mainly because receptor susceptibility may be higher for cumulative effects than for the proposal alone.	forward for detailed cumulative assessment.
		Three SLQs which SNH highlighted in their scoping response that are proposed to be scoped out of the assessment require clear justification for these omissions, as follows: <ul style="list-style-type: none"> • <i>Broad farmed straths</i> - SNH believe this SLQ, experienced within the CNP from the Cromdale Hills, is very sensitive to the proposal and thus should be included in the assessment. As mentioned above for the recommended viewpoints on the A939 and Cromdale Hills, the proposal will be visible upon the backdrop of hills to Strathspey and is thus likely to affect this SLQ both individually and cumulatively. • <i>Extensive moorland, linking the farmland, woodland and the high tops</i> - The experience of this SLQ extends seamlessly from the CNP into the distinct landscape character and special qualities of Dava Moor (contributing to the SLA), particularly around Auchnagallin and between Creag Liath and Creag na h-lolaire (east to west). 	Noted. The ' <i>broad farmed straths</i> ' and ' <i>extensive moorland, linking to farmland, woodland and the high tops</i> ' qualities have been included in the SLQ assessment for the CNP. With regard to <i>dark skies</i> , the effect of aviation lighting on this SLQ is assessed in the CNP SLQ assessment in Appendix 5.2 .

Consultee	Scoping/Other Consultation and Date	Issue Raised	Response/Action
		Nonetheless, it is appreciated that these areas are within the margins of the CNP and thus further (documented) assessment may enable scoping-out of this specific SLQ from the assessment if it can be confirmed that significant effects are unlikely. <ul style="list-style-type: none"> • <i>Dark skies</i> - SNH's scoping response requested confirmation of whether aviation lighting is required for the proposal. 	
	Email 26 th August 2020	Confirmed agreement with viewpoint locations for the Aviation Lighting Night-Time Assessment, however requested a fourth viewpoint from Creagan a Chaise to represent views from higher elevations and views from the Hills of Cromdale, which sit within the Tomintoul and Glenlivet Dark Sky Park. A light intensity ZTV was also requested.	Noted. A fourth viewpoint from Creagan a Chaise has been included within the Aviation Lighting Night-Time Assessment, and a ZTV illustrating light intensity is presented in Figure 5A.4.1 .
Moray Council	Scoping Opinion 27 th April 2020	Suggested the inclusion of a number of additional viewpoints.	All viewpoint requests made through Scoping were considered, potential visibility was analysed and those deemed suitable for the LVIA were re-consulted upon. Given intervening landform and vegetation limiting visibility, significant visual effects were considered unlikely from the other requested viewpoints and these were not considered further.
		Appropriate recognition and weight should be attached to Moray Onshore Wind Energy	The proposed development is located in THC authority however

Consultee	Scoping/Other Consultation and Date	Issue Raised	Response/Action
		Guidance 2017 which contains information on constructed, consented or applied for wind energy proposals in central and western Moray. All should be taken into consideration as part of the EIA process for LVIA and any cumulative assessment should include wind energy development in Moray within a minimum 30km radius.	cognisance has been taken of the Moray council guidance. The cumulative assessment has considered schemes within 40km of the proposed development.
		The Moray Wind Energy Landscape Capacity Study 2017 should be considered.	The Moray Wind Energy Landscape Capacity Study 2017 has been considered in the section on Likely Significant Landscape Effects .
	Email 20 th August 2020	Confirmed agreement with viewpoint locations for the Aviation Lighting Night-Time Assessment.	Noted.
East Nairnshire Community Council	Scoping Opinion 17 th March 2020	Four additional viewpoints have been requested: <ul style="list-style-type: none"> • A939 from Nairn • Remore • Cairn Glas Brae on the A939 • Hill track to Loch Kirkcaldy 	All viewpoint requests made through Scoping were considered, potential visibility was analysed and those deemed suitable for the LVIA were re-consulted upon. Given intervening landform and vegetation limiting visibility, significant visual effects were considered unlikely from the other requested viewpoints and these were not considered further.
		The nine additional turbines proposed for the Berry Burn Extension should be taken into account within the LVIA.	The Berry Burn Extension is considered within the cumulative assessment.
Energy Consents Unit (ECU)	Scoping Opinion 13 th May 2020	The final list of viewpoints and visualisations should be agreed following discussion with The Highland Council, Historic Environment Scotland and SNH. At this stage it is also advised that the additional viewpoints	Further consultation with the relevant organisations mentioned has been undertaken to agree the final list of

Consultee	Scoping/Other Consultation and Date	Issue Raised	Response/Action
		as requested by THC and East Nairnshire Community Council are included.	viewpoints assessed in the LVIA.
		Aviation Lighting may be required due to the proposed scale and location of turbines. As such, a robust Night Time Assessment should be included within the LVIA Chapter in the EIAR	An Aviation Lighting Night-Time Assessment has been undertaken.
Cairngorms National Park Authority (CNPA)	Email 5 th March 2020	Confirmed that the proposed development is located approximately 8km from the CNP boundary. Noted that SNH provide advice on potential effects on the effects of the proposed development on the SLQs of the CNP and therefore have no comments to provide at this stage.	Noted.
Scotways	Scoping Opinion 3 rd April 2020	Core Paths Plans must be consulted, and all core paths and Rights of Way within the study area must be mapped.	Noted.
		Stated that there are no rights of way, as recorded in the National Catalogue of Rights of Way, that would be affected by the proposed development.	Noted.

Study Area

- 5.16 The study area for the assessment is defined as 40km radius from the outermost turbines of the proposed development, as recommended in SNH guidance for turbines between 131-150m to blade tip⁶. The study area is shown in Figure 5.1.1.
- 5.17 To consider cumulative effects of the proposed development in relation to other schemes in the wider area, wind farms within 40km of the proposed development have been included. These inform the modelling and assessment, as agreed with SNH, THC and Moray Council. A review of patterns of wind farm development across the study area is also provided following guidance from SNH⁷ (see Figure 5.1.6).
- 5.18 A ZTV map was generated, illustrating areas from where the proposed development may be visible in the study area. The ZTV is based on bare earth topography and therefore does not take account of potential screening by vegetation or buildings. The ZTV is used as tool for understanding where significant visual effects may occur. Receptors which are outside the

⁶ SNH (2017) Visual Representation of Wind Farms, Version 2.2

⁷ SNH (2012) Assessing the Cumulative Impacts of Onshore Wind Energy Developments.

ZTV will not have visibility of the proposed development and are not considered further in this LVIA. The ZTV to blade tip height (149.9m) is shown in Figure 5.1.2a, and the ZTV to hub height (91.4m) is shown in Figure 5.1.3a.

Desk Based Research and Data Sources

5.19 The following data sources have informed the assessment:

Mapping

- Ordnance Survey (OS) Maps at 1:50,000 Scale (Landranger) and 1:25,000 Scale (Explorer);
- Online map search engines; and
- British Geological Survey website, 2020.

Modelling

- OS Terrain 5 and 50 height data;
- 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); and
- Raster Data at 1:250,000 (to provide a more general location map).

Cumulative Assessment

- Data from other wind farm applications; and
- THC, Moray Council and the ECU planning portals.

Field Survey

5.20 Field survey work was carried out during several visits under differing weather conditions between March 2020, May 2020 and August 2020, 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 specific viewpoints, settlements and routes.

Visualisation and Modelling

5.21 The methodology for producing the visualisations was based on current good practice guidance as set out by SNH⁸ and THC⁹. Detailed information about the approach to viewpoint photography, ZTV and visualisation production is provided in Appendix 5.1.

Assessing Significance

Sensitivity Criteria

5.22 Judgements regarding the sensitivity of landscape or visual receptors require consideration of both the susceptibility of the landscape or visual receptor to the type of development proposed and the value attached to the landscape or visual resource. Judgements are

recorded as **high**, **medium** or **low**. Detailed information about the approach to assessment of sensitivity is provided in Appendix 5.1.

Magnitude of Change

5.23 Judgements regarding the magnitude of landscape or visual change are recorded as **high**, **medium** or **low** and combine an assessment of the scale and geographical extent of the landscape or visual effect, its duration and reversibility. Detailed information about the approach to assessment of magnitude is provided in Appendix 5.1.

Significance Criteria

5.24 The predicted significance of the effect is determined through a standard method of assessment based on professional judgement and guidance, considering both sensitivity and magnitude of change. **Major** and **moderate** effects are considered significant in the context of the EIA Regulations.

5.25 Judgements are made on a case by case basis. Appendix 5.1 provides full details of the criteria considered in judging the identified aspects of sensitivity (susceptibility and value) and magnitude of change (scale, geographical extent, duration and reversibility), and the grades used to describe each. In terms of the direction of effects (beneficial or adverse) there is a wide spectrum of opinion with regard to wind energy development. Taking a precautionary stance, effects are assumed to be adverse unless stated otherwise.

5.26 Where the magnitude of change that is predicted to occur as a result of the introduction of the proposed development is identified as being either low or barely perceptible, potential cumulative effects on the relevant landscape or visual receptor are not assessed in the cumulative assessment. In these instances, it is considered that owing to the limited magnitude of change, there will not be potential for significant cumulative effects to arise.

Assessment Limitations

5.27 No substantial information gaps have been identified during the preparation of baseline information or in undertaking the assessment, and it is considered that there is sufficient information to enable an informed decision to be taken in relation to the identification and assessment of likely significant effects on landscape, views and visual amenity.

Landscape Baseline Conditions

5.28 This section presents an overview of the landscape baseline covering current landscape character (including constituent landscape elements), landscape condition and any designations attached to the landscape.

⁸ SNH (2017). Visual Representation of Wind Farms, Version 2.2.

⁹ THC (2016) Visualisation Standards for Wind Energy Developments

The Site and Context

- 5.29 The site lies approximately 2km to the south-east of the small settlement of Ferness, within The Highland Council local authority area. The site is bound to the west by the A939, and to the east by a post and wire fence which marks the boundary with the Moray Council local authority. To the north, the site extends to the edge of existing coniferous forest at New Inn Wood and Airdrie Plantations, and to the south the site again meets the Moray Council boundary where it dissects Lochan Tùtach.
- 5.30 The site rises to its highest point at Cairn Duhie (312m Above Ordnance Datum (AOD)), a low conical hill with land sloping down from it in all directions. The lowest point is at approximately 200m AOD, at the northern edge of the site. The southern part of the site is drained by the Burn of Lochantùtach, which runs east and then 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 open moorland and blanket bog, with a few scattered trees. Further information about the land cover is found in **Chapter 7: Ecology**. An overhead transmission line runs through the northern part of the site.
- 5.31 Within 1km to the north and west of the site there are properties at Ferness and scattered properties along the B9007. To the south and south-east of the site there are two properties within 1km of the site, and to the east of the site there are a number of properties along, or off the A940, within 1.5km.
- 5.32 The Dava Way is located within 5km of the site to the east, as it extends in a south to north orientation within the study area following the old Highland Railway Line.

The Study Area

- 5.33 The study area, shown in Figure 5.1.1, extends to 40km from the outermost turbines of the proposed development in all directions. The west to north-western part of the study area lies within The Highland Council local authority area, whilst the east and north-eastern part lies within Moray Council local authority area. Within 10km to the south of the site lies the Cairngorms National Park which covers approximately a quarter of the study area. The study area extends from just south of the Dornoch Firth in the north to the Cairngorm mountains in the south, and from Glen Fiddich in the east to the Beauly Firth in the west.
- 5.34 The landscape character of the study area is varied, as the landscape transitions from upland plateau in the south, to low lying coastal landscape in the north. Landscape character includes: remote open moorland plateau and mountain ranges in the south of the study area; low lying coastal farmland along the Moray Firth and open sea in the north; straths and glens, rolling hills and farmland in the west; and open upland, upland valleys and farmland in the east. There are also extensive areas of coniferous forest in the study area, particularly across Nairnshire, Moray and Strathspey. Open, upland moorland is a typical feature of the higher ground and extends to the boundary of the Cairngorms National Park to the south

(approximately 12km), to Rothes in the east (approximately 30km), and to the Monadhliath Mountains to the south-west (approximately 40km).

- 5.35 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 Grampian and Dava group metamorphic rocks.
- 5.36 The main mountain ranges in the study area include the Hills of Cromdale, located approximately 20km to the south-east of the site, with its highest summit being Creagan a Chaise (722m AOD), and the Cairngorm Mountains located approximately 35km to the south of the site, home to the highest point in the study area: Cairn Gorm (1245m AOD).
- 5.37 The main valleys across the study area include: the Findhorn Valley, located within 5km, traversing the centre of the study area to the west and north-east of the site; Strathspey, which traverses the southern and eastern parts of the study area in a south-west to north-east orientation, located approximately 16km away at its closest point to the site; Strathnairn, located west of the site extending from Dunmaglass to the Clava Cairns, located approximately 23km from the site at its closest point; Strathdearn located within 25km of the site to the south-west; and the northern tip of the Great Glen, located approximately 35km to the west.
- 5.38 The land use of the study area responds to topography and elevation. In the open and more elevated parts of the study area to the south, moorland and rough grazing predominate. Further south, key transport routes, such as the A9, are located within upland valleys and straths which are surrounded by the rolling moorland and the rugged mountains of the Cairngorms, both of which lack settlement.
- 5.39 Within the coastal lowlands to the north there is pasture and some arable farmland as well as larger settlements and key transport routes, such as the A96 that links Inverness, Nairn, Forres and Elgin.
- 5.40 Immediately west of the site there are large and scattered areas of coniferous plantation, traversed by key transport routes such as the A939 and the B9007, as well as corridors of broadleaf and native woodland that follow the Findhorn Valley. Further west, land use transitions from open moorland used for deer grazing to pastoral and arable farmland on the floor of Strathnairn, with side slopes covered in a mix of broadleaf woodlands and coniferous forestry.
- 5.41 To the east of the site lies the A940 which borders the Knock of Braemoray and an expansive area of open moorland which houses a number of existing wind farm developments including Berry Burn, Paul's Hill and Hill of Glaschyle. Coniferous plantation creates transition between the open moorland and upland farmland and farmed valleys which lie further east.
- 5.42 The main roads within the study area include: the A9 from Inverness to Aviemore; the A96 along the Moray Coast; the A95 from Aviemore to Charlestown of Aberlour; the A939 which runs from Nairn past the site to Grantown-on-Spey and 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. There is a network of minor roads across the lowland areas and straths, but there are few roads in proximity 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.

- 5.43 Recreational routes within the study area include: National Cycle Network (NCN) Route 1 which runs along the coastal lowlands in the north, approximately 11km from the site at its closest point, passing through Inverness, Nairn, Forres and Elgin and along the northern parts of the Moray Firth and Cromarty Firth; NCN Route 7 in the west of the study area, approximately 20km from the site at its closest point, which largely follows the Highland Main Line railway and the A9 between Carrbridge and Culloden; NCN Route 78 (Caledonia Way) which is located in the far west of the study area, approximately 32km from the site at its closest point, running through the Great Glen towards Inverness; and NCN Route 3 (Old Logging Way), located in the south-west and approximately 33km from the site at its closest point, which is a short route that runs from Glenmore Forest Park to Coylumbridge.
- 5.44 Promoted walking routes within the Study Area include the Dava Way, located to the east of the site, approximately 2.7km away at its closest point, following the old Highland Railway Line between Grantown-On-Spey and Forres. The Speyside Way is to the south of the site, partly within 20km, and runs from Aviemore to beyond the Study Area boundary in the north-east. Other promoted walking routes include the Moray Coast Trail to the north-east of the site (approximately 19km away) and the Great Glen Way to the west (approximately 32km away). The Great Glen Canoe Trail is also within the Study Area, approximately 34km to the west of the site. There are also a number of core paths within the Study Area, most of which located between 15 to 40km away, within the Cairngorms National Park to the south, to the north within and between larger settlements, and to the east.
- 5.45 Nucleated settlements in the Study Area tend to be located in the lower-lying northern part 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 along valleys. Larger settlements within the study area include Nairn to the north-west of the site (approximately 15km away), Forres to the north-east (approximately 15km away), Grantown-On-Spey to the south (approximately 16km away), Inverness to the west (approximately 25km away), Elgin to the north-east (approximately 27km away), Charlestown of Aberlour to the east (approximately 28km away) and Aviemore to the south-west (approximately 28km away).
- 5.46 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 development on recreational interests are

discussed in **Chapter 12: Socio-Economics, Tourism and Recreation**, but many landscape and visual receptors are also represented within this LVIA.

Existing Wind Farm Developments

- 5.47 Operational wind farms and those under construction in the study area are considered as part of the baseline. These are listed in Table 5.2 and shown in Figure 5.1.6.

Table 5.2: Existing Wind Farm Developments

Wind Farm	Status	No. of Turbines	Blade Tip Height (m)	Distance ¹⁰ (km)
Hill of Glaschyle	Operational	12	100	6.3
Berry Burn	Operational	29	104	6.3
Paul's Hill	Operational	28	100	12.2
Tom nan Clach	Operational	13	125	12.5
Moy	Operational	20	125	17.7
Rothes - Phase 2	Operational	18	125	19.3
Kellas	Under construction	4	110	20.6
Rothes Phase - 1	Operational	22	100	20.9
Hunthill	Under construction	4	67	25.4
Farr	Operational	40	101	26
Kyllachy	Under construction	20	110	26.5
Dorenell	Operational	59	126	34.7
Hill of Towie	Operational	21	100	36.5
Dunmaglass	Operational	33	125	39

Landscape Character Types

- 5.48 This section provides a description of landscape character (including constituent landscape elements) - drawing on SNH's National Landscape Character Assessment (2019)¹¹, and supplemented with project specific research and field work where relevant.
- 5.49 The site is located within Landscape Character Type (LCT) 291: Open Rolling Uplands, as shown in Figure 5.1.4a. The wider study area includes many different LCTs from lowland, coastal and farmland areas to high plateaux, hills and upland glens.

¹⁰ This is an approximate distance taken between the outermost turbine of both the Proposed Development and each existing wind farm.

¹¹ SNH (2019) Scottish Landscape Character Types Map and Descriptions

5.50 The LCTs within 40km of the proposed development are illustrated on Figure 5.1.4a and listed in Table 5.3 below. Figure 5.1.4b shows the ZTV at blade tip height (149.9m) across LCTs within the study area. The theoretical visibility of the proposed development (ZTV coverage) 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 effects as a result of the proposed development. LCTs with limited theoretical visibility and distant LCTs are unlikely to be subject to significant effects on landscape character and are not considered further within the assessment.

Table 5.3: Landscape Character Types

Landscape Character Type	Theoretical visibility of proposed development (ZTV coverage) and other considerations to determine if LCT is carried forward for detailed assessment
0 - Urban	No theoretical visibility - not considered further
122 - Mountain Massif - Cairngorms	Areas of theoretical visibility from high peaks and upper slopes but beyond 30km - not considered further
123 - Smooth Rounded Hills - Cairngorms	Areas of theoretical visibility on the northern and western extents (Hills of Cromdale) but beyond 17km - not considered further
125 - Rolling Uplands - Cairngorms	Some limited theoretical visibility within 10km at Auchnagallin, elsewhere limited and distant - not considered further
126 - Upland Glen - Cairngorms	Limited theoretical visibility but beyond 25km - not considered further
127 - Upland Strath	Very limited theoretical visibility - not considered further
128 - Forested Upland Fringe	Limited theoretical visibility but beyond 15km - not considered further
131 - Upland Basin - Cairngorms	Limited theoretical visibility but beyond 15km - not considered further
132 - Undulating Wooded Farmland - Cairngorms	Very limited theoretical visibility from the northern fringes within 10km, and surrounding woodland cover in areas with theoretical visibility will reduce actual visibility further - not considered further
133 - Farmed Straths and Glens	Very limited theoretical visibility - not considered further
221 - Rolling Uplands - Inverness	Very limited theoretical visibility - not considered further
222 - Rocky Moorland Plateau - Inverness	No theoretical visibility - not considered further
223 - Flat Moorland Plateau with Woodland	No theoretical visibility - not considered further
224 - Farmed and Wooded Foothills	No theoretical visibility - not considered further
225 - Broad Steep-Sided Glen	No theoretical visibility - not considered further
227 - Farmed Strath - Inverness	Very limited theoretical visibility - not considered further
228 - Rolling Farmland and Woodland	Limited theoretical visibility but beyond 15km - not considered further
281 - Beaches, Dunes and Links - Moray & Nairn	Some theoretical visibility but beyond 15km - not considered further

Landscape Character Type	Theoretical visibility of proposed development (ZTV coverage) and other considerations to determine if LCT is carried forward for detailed assessment
282 - Cliffs and Rocky Coast - Moray & Nairn	Theoretical visibility however these areas are beyond 25km - not considered further
283 - Coastal Forest	Widespread theoretical visibility but mostly beyond 15km - not considered further
284 - Coastal Farmlands - Moray & Nairn	Areas of theoretical visibility within 15km to the north of the site - considered further
285 - Rolling Farmland and Forests - Moray & Nairn	Intermittent areas of theoretical visibility within 15km to the north, north-east and north-west of the site - considered further
286 - Narrow Wooded Valley - Moray & Nairn	Widespread theoretical visibility within 15km to the north, north-east and west of the site - considered further
287 - Broad Farmed Valley	No theoretical visibility - not considered further
288 - Upland Farmland	No theoretical visibility - not considered further
289 - Upland Farmed Valleys	No theoretical visibility - not considered further
290 - Upland Moorland and Forestry	Widespread theoretical visibility within 15km to the north-east, north-west and west of the site - considered further
291 - Open Rolling Upland	The proposed development is located within the LCT and there is widespread theoretical visibility within 15km - considered further.
292 - Open Upland	Limited theoretical visibility but beyond 15km - not considered further
293 - Low Forested Hills	No theoretical visibility - not considered further
294 - Upland Valleys - Moray & Nairn	Limited theoretical visibility from valley fringes - not considered further
341 - Forest Edge Farming	Theoretical visibility but beyond 35km - not considered further
342 - Farmed River Plains	No theoretical visibility - not considered further
343 - Coastal Shelf	Theoretical visibility but beyond 25km - not considered further
344 - Lowland Farmed Plain - Ross & Cromarty	Theoretical visibility but beyond 30km - not considered further
345 - Farmed and Forested Slopes - Ross & Cromarty	Intermittent theoretical visibility but beyond 25km - not considered further
346 - Open Farmed Slopes	Limited theoretical visibility but beyond 25km - not considered further
348 - Cliffs and Rocky Coasts - Ross & Cromarty	Widespread theoretical visibility but beyond 25km - not considered further

Designated Landscapes

5.51 The site is not within any designated landscapes but there are a number of designated landscapes within the study area as shown in Figure 5.1.5a and listed in Table 5.4 below. This includes the Drynachan, Lochindorb and Dava Moors Special Landscape Area (SLA), which borders the site to the south-west, and the Cairngorms National Park which is approximately

8km to the south. There are a number of SLAs within Moray in the east and north-east of the study area, including the Findhorn Valley and the Wooded Estates SLA approximately 1.8km to the north-east at its closest point.

5.52 There are a number of Gardens and Designed Landscapes (GDLs) within the study area some of which are open to members of the public. This includes Relugas GDL which is located approximately 4.5km to the north-east of the nearest proposed turbine, Darnaway Castle approximately 9.3km to the north-east, Castle Grant approximately 12km to the south-east, Cawdor Castle approximately 12km to the north-west and Brodie Castle approximately 13km to the north. Effects on views from and the setting of GDLs will be considered in **Chapter 6: Cultural Heritage**.

5.53 The ZTV along with an understanding of the special qualities of each area is used as a means of identifying which designated landscapes require further assessment. Figure 5.1.5b shows the ZTV at blade tip height (149.9m) across designated landscapes within the 40km study area.

Table 5.4: Designated Landscapes

Designated Landscapes	Theoretical visibility of proposed development (ZTV coverage) and other considerations to determine if Landscape Designation is carried forward for detailed assessment
National Parks	
Cairngorms National Park (CNP)	Intermittent theoretical visibility, including within 10km - considered further
National Scenic Areas (NSA)	
The Cairngorm Mountains NSA	Intermittent theoretical visibility however beyond 25km - not considered further
The Highland Council Special Landscape Areas (SLA)	
Drynachan, Lochindorb and Dava Moors SLA	Widespread theoretical visibility within 15km - considered further
Sutors of Cromarty, Rosemarkie and Fort George SLA	Widespread theoretical visibility however beyond 15km - not considered further
Loch Ness and Duntelchaig SLA	No theoretical visibility - not considered further
Moray Council Special Landscape Areas (SLA)	
Findhorn Valley and the Wooded Estates SLA	Widespread visibility within 15km - however, there will be no direct effects on this designated landscape and, due to the well wooded character of the SLA, the opportunity for outwards views towards the proposed development is limited. Views from the lower lying valley floor are also limited - not considered further
Pluscarden Valley SLA	Very limited theoretical visibility from the fringes of the SLA- not considered further
Culbin to Burghead Coast SLA	Widespread theoretical visibility but beyond 15km - not considered further

Designated Landscapes	Theoretical visibility of proposed development (ZTV coverage) and other considerations to determine if Landscape Designation is carried forward for detailed assessment
Cluny Hill SLA	Widespread theoretical visibility but beyond 15km - not considered further
The Spey Valley SLA	Very limited theoretical visibility - not considered further
Ben Rinnes SLA	Very limited theoretical visibility - not considered further
Quarrelwood SLA	No theoretical visibility - not considered further
Burghead to Lossiemouth Coast SLA	Very limited theoretical visibility - not considered further
Spynie SLA	No theoretical visibility - not considered further
Lossiemouth to Portgordon Coast SLA	Very limited theoretical visibility - not considered further
Lower Spey and Gordon Castle Policies SLA	No theoretical visibility - not considered further

Wild Land Areas

5.54 Wild Land Areas (WLA) are not designated but have been mapped¹² and described¹³ by SNH, and are considered sensitive to development. They are classified as “*areas of significant protection*” within Scottish Planning Policy (SPP) (Table 1. Page 39, SPP) which states that development proposed within these areas should “*demonstrate that any significant effects on the qualities of these areas can be substantially overcome by siting, design or other mitigation*”.

5.55 There are two WLAs within the south of the study area as shown on Figure 5.1.5a: WLA 15 Cairngorms is located approximately 25km to the south of the proposed turbines; and WLA 20 Monadhliath is located approximately 28km the south-west of the proposed turbines. The ZTV (Figure 5.1.5a) identifies intermittent theoretical visibility across WLA 15 Cairngorms, however it is considered that significant effects on this WLA are unlikely at such distance, and therefore this WLA has not been considered further within this assessment. Qualities relating to wildness that occur outside WLA 15 Cairngorms contribute to the SLQs of the CNP and are therefore be considered in the assessment of effects on the CNP (refer to Appendix 5.2). Theoretical visibility from WLA 20 Monadhliath is very limited and therefore this WLA has not been considered further within this assessment.

Visual Baseline Conditions

5.56 This section identifies the extent of potential visibility of the proposed development and identifies visual receptors that are assessed as part of the LVIA. This section also introduces

¹² <https://www.nature.scot/wild-land-2014-maps>

¹³ <https://www.nature.scot/wild-land-area-descriptions>

the viewpoints that are used to assess effects on receptors, including reasons for their selection.

Analysis of Visibility of the Proposed Development

- 5.57 The ZTVs in Figures 5.1.2a and 5.1.3a show theoretical visibility of the proposed development to turbine blade tip height (149.9m) and hub height (91.4m) respectively, across the 40km study area. The ZTV indicated that across the 40km study area, visibility of the proposed development is relatively widespread within approximately 15km of the site, becoming more localised beyond this distance, except for the Moray Firth where theoretical visibility appears to be widespread.
- 5.58 Within 5km of the site there is theoretical visibility from the A939, the A940 and the B9007, as well as minor roads in the west and north-west as they run along the Findhorn Valley. There is theoretical visibility from a number of properties around Ferness, Dava and Redburn, as well as scattered properties such as Little Aitnoh (south-west of the site), Little Lyne and Muckle Lyne (north of the site), and Kerrow (east of the site). At Ferness and along the upper fringes of the Findhorn Valley, the ZTV indicates that theoretically visibility is more limited and ranges between 1 and 12 turbines. On the Findhorn Valley floor, however, there will be no visibility, including from the few properties located on the valley floor within 5km of the site. There will be limited visibility across areas of open moorland within 5km of the site near Lochindorb to the south (located within the Drynachan, Lochindorb and Dava Moors SLA), and to the east of Knock of Braemoray, with only small areas of theoretical visibility of between 1 and 12 turbines. There is will be visibility from the summit of the Knock of Braemoray, as well as from sections of the Dava Way, both of which are located to the east of the site.
- 5.59 Between 5km and 10km from the site, there will be visibility along and around stretches of the A939 to the north-west and south of the site, and along the stretch of the Dava Way that runs parallel to the A939 to the south. There will also be visibility from along north-eastern stretches of the A940. Properties and small settlements along these roads, including properties around Littlemill to the north-west near the A939, and properties near Logie to the north-east along the A940, have theoretical visibility of the proposed development, which may be more filtered by trees in practice. Some minor roads within 5 - 10km to the east and north-east of the site have theoretical visibility, as well as scattered properties located along these minor roads. To the south of the site within the Drynachan, Lochindorb and Dava Moors SLA, visibility will be more intermittent and include limited views from along the minor road that runs along the eastern side of Lochindorb and Lochindorb Castle, with visibility of between 1 and 6 turbines. There will also be visibility from the summit of Carn nan Gabhar located above Lochindorb to the south-east of the loch.
- 5.60 Between 10km and 20km from the site, theoretical visibility is generally more intermittent and extends to the east and south-east across the open upland slopes facing the site, and around settlement on the lower lying coastal land to the north. There is the potential for visibility across Forres and surrounding nearby settlement such as Califer and Burghead, as well as stretches of the A940 as it comes into Forres. However, actual visibility is often

screened by roadside forest cover from this stretch of the road. Similarly, there is theoretical visibility indicated across most of Nairn and around Ardersier, Blackcastle and Lochside to the west of Nairn. There is theoretical visibility across intermittent sections of the A96 within 10 - 20km of the site as the road approaches and leaves settlement along the Moray coast. To the south-east there will be visibility from the site-facing hill flanks of the Hills of Cromdale, located within the CNP.

- 5.61 Beyond 20km, theoretical visibility is more intermittent and limited, with the exception of the Moray Firth where widespread theoretical visibility is indicated, in practice being limited and distant. To the south of the site theoretical visibility occurs in small intermittent areas within the CNP across site-facing hill flanks. Similarly, to the east and west of the site, theoretical visibility is very limited with small intermittent areas on hill summits, including Ben Rinnes to the south-east. To the north there is intermittent visibility indicated from along the coastal fringes, including Fortrose and Sutors of Cromarty. There is also theoretical visibility across parts of the Black Isle, again at distance and limited in practice.

Key Visual Receptors

- 5.62 Potential visual receptors include:
- Residents, including views from settlements and scattered properties;
 - Those engaged in recreational activity (e.g. hill walkers, runners and cyclists); and
 - Road users (including those travelling on recognised tourist routes in and out of the CNP).

Selection of Viewpoints for the Assessment

- 5.63 This section sets out the viewpoints that are used to represent and assess the visual effects of the proposed development. 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 development will be visible. 18 no. viewpoints were selected across the 40km study area: these were largely informed by the viewpoints used in the 2013 Cairn Duhie Wind Farm LVIA, with some refinements to take account of comments made by statutory consultees including SNH, CNPA, THC and East Nairnshire Community Council. The viewpoints are all in publicly accessible locations and include:
- Locations selected to represent the experience of different types of receptor;
 - Locations which provide a representative range of viewing angles and distances (i.e. short, medium and long-distance views);
 - Locations which represent a range of viewing experiences (i.e. static views and points along sequential routes);
 - Locations which illustrate key cumulative interactions with other existing, consented and/or proposed wind farms (i.e. either in combination or succession);
 - Specific viewpoints selected because they represent promoted views or viewpoints within the landscape; and
 - Illustrative viewpoints chosen specifically to demonstrate a particular visual effect or specific issue.

5.64 The viewpoints are listed in Table 5.5 and shown on Figures 5.1.2a and 5.1.3a.

Table 5.5: Viewpoint Locations

VP No.	Location	Grid Reference (NGR)		Distance from nearest turbine (km) ¹⁴	Reason for Selection
1	A939 South of Ferness Village	296974	842878	0.42	Represents views experienced by road users travelling southwards from Ferness Village on the A939.
2	Little Aitnoch	297072	840875	1.1	Represents views experienced by residential receptors at Little Aitnoch, as well as road users travelling towards the A939 via the old military road that passes through Little Aitnoch.
3	Hill track to Loch Kirkcaldy	295580	842173	1.75	Represents views experienced by recreational receptors using this hill track. Requested by East Nairnshire Community Council.
4	Ferness	296246	844818	1.55	Represents views experienced by road users at the junction between the B9007 and the A939 and similar views experienced by residential receptors at Ferness.
5	A940, above Kerrow	300053	841893	1.71	Represents views experienced by road users of the A940 travelling both north and south.
6	A939, west of Aitnoch	297997	839720	2.09	Represents views experienced by road users on the A939 travelling northwards, as well as similar views experienced by residential receptors at Aitnoch.
7	B9007, near Mount	298014	846328	2.39	The viewpoint represents views from the north of the site, from the B-road between Ferness and Relugas and from local properties.
8	Ardclach Bell Tower	295388	845321	2.54	Represents views experienced by tourist/ recreational receptors visiting the historic visitor attraction of Ardclach Bell Tower

VP No.	Location	Grid Reference (NGR)		Distance from nearest turbine (km) ¹⁴	Reason for Selection
9	Knock of Braemoray	301101	841800	2.75	Represents elevated views experienced by recreational receptors from this hill summit, with views across the Drynachan, Lochindorb and Dava Moors SLA to the south-west.
10	Cairn Glas Brae on the A939	295915	846658	3.18	Represents views experienced by road users travelling south along the A939, with views across the Findhorn Valley.
11	B9007, Old Military Road	294199	838878	4.51	Represents views experienced by road users of the B9007 travelling northwards.
12	Drumguish Croft	300590	837550	4.85	Represents views experienced by road users of the A939 travelling northwards towards Dava along a key route in and out of the CNP, as well as similar views experienced by residential receptors at Drumguish Croft.
13	A940, Auchearn	302037	847230	5.22	Represents glimpsed views from the A940, the Dava Way which passes along the disused railway to the east of the viewpoint, and from local properties.
14	A939 and Dava Way	301422	834555	7.9	Represents views experienced by road users of the A939 travelling northwards, as well as similar views experienced by recreational receptors travelling along the Dava Way.
15	Carn nan Gabhar above Lochindorb	298030	833770	8.03	Represents elevated views experienced by recreational receptors from the summit of Carn nan Gabhar.
16	Carn Kitty	308965	842760	10.48	Represents elevated views experienced by recreational receptors from the summit of Carn Kitty.
17	Carn Allt Laoigh	292262	831278	11.83	Represents elevated views experienced by recreational receptors from this hill summit at the edge of the CNP boundary, with views across

¹⁴ Distance between viewpoint and the nearest turbine of the Proposed Development.

VP No.	Location	Grid Reference (NGR)		Distance from nearest turbine (km) ¹⁴	Reason for Selection
					the Drynachan, Lochindorb and Dava Moors SLA to the north, and the CNP to the south.
18	Carn a Ghille Chearr	313962	829849	19.74	Represents elevated views experienced by recreational receptors from the summit of Carn a Ghille Chearr on the boundary of the CNP, with views across the Drynachan, Lochindorb and Dava Moors SLA to the north-west.

Settlements

5.65 Theoretical visibility of the proposed development from settlements across the study area is illustrated by Figures 5.1.2a and 5.1.3a and described in Table 5.6 below. The ZTV does not take account of any screening or filtering of views by built form or vegetation, which will substantially reduce visibility from the majority of settlements. In order to focus on potentially significant effects, settlements from which there is no theoretical visibility are not considered further in this assessment. Settlements with limited visibility over a longer distance i.e. beyond 15km from the proposed development; or where views of the surrounding landscape (including the site) are not important to setting, and where it is unlikely that significant effects could occur, are also not considered further in the assessment.

Table 5.6: Settlements

Settlement	Theoretical Visibility of Development (ZTV coverage)
Inverness	No theoretical visibility - not considered further
Nairn	Widespread theoretical visibility at a distance of approximately 15km, however much of the settlement will 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 - not considered further
Forres	Widespread theoretical visibility at a distance of approximately 15km, however there are limited locations with views to the south-west due to local buildings and tree planting - not considered further
Elgin	No theoretical visibility - not considered further
Cromarty	No theoretical visibility - not considered further
Fortrose	Widespread theoretical visibility but beyond 25km - not considered further
Findhorn	Widespread theoretical visibility but beyond 20km - not considered further
Burghead	Widespread theoretical visibility but beyond 25km - 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

Settlement	Theoretical Visibility of Development (ZTV coverage)
Rothies	No theoretical visibility - not considered further
Ferness	Theoretical visibility within 5km - considered further
Relugas	Theoretical visibility within 5km. However, woodland, rising terrain and agricultural buildings to the south of this small settlement are likely to screen views towards the site - not considered further
Logie	Theoretical visibility within 10km however actual views towards the south and south-west are screened by the tops of the trees of the woods along the Findhorn valley - not considered further
Edinkillie	Theoretical visibility within 5km, however woodland surrounding the church and stretches of the A940 leading in and out of the settlement is likely to screen views towards the site - not considered further
Dava	Widespread theoretical visibility within 5km - considered further
Redburn	Widespread theoretical visibility within 5km, however many individual properties are set within woodland and therefore most views are screened. Those with more open views may have visibility of the proposed development, but these are likely to be screened or filtered in part by nearby woodland. While there may be some views, it is considered unlikely that there will be widespread visual impacts on this settlement - not considered further.

Routes

5.66 Theoretical visibility of the proposed development from routes (roads, railways and recreational routes) is illustrated on Figures 5.1.2a and 5.1.3a. Within the study area, road and rail routes tend to use low lying areas or valleys and passes, whereas walking routes are more variable and can pass over hills and along ridges. Visibility from a route will vary as you move along it, depending on the surrounding topography, built form and vegetation pattern alongside the route.

5.67 Based on an analysis of theoretical visibility and potential views, Table 5.7 below provides information on which routes have been carried forward for detailed assessment. Due to the lower susceptibility of receptors typically using roads and railways, those beyond 15km from the proposed turbines have been scoped out of the assessment. Single track roads have also been scoped out of the assessment as they tend to be less frequently used by large numbers of road users. Due to the higher susceptibility of receptors using promoted long-distance footpaths and cycle routes, including National Cycle Network (NCN) routes, these have been included when they fall within 15km from the proposed turbines. Where there is limited theoretical visibility, or where actual visibility from a route is likely to be limited due to localised screening, these routes are not considered further as the likelihood for significant effects is limited. Assessment of Core Paths includes the Dava Way which is located within 5km of the site. It is considered that users of Core Paths beyond 10km are unlikely to experience significant effects due to intervening woodland and forestry, topography and built form, therefore Core Paths beyond 10km have been scoped out. There are no other Core Paths within 10km of the site beyond the Dava Way.

Table 5.7: Routes

Route	Theoretical Visibility of Development (ZTV coverage)
Major Roads	
A939 Nairn to Tomintoul	Widespread theoretical visibility along the road within 15km - considered further
A940 Forres to Dava	Widespread theoretical visibility along the road within 15km - considered further
B9007 Logie to Duthil	Widespread theoretical visibility along the road within 15km - considered further
A96 Inverness to Aberdeen	Theoretical visibility along the stretches of the road within 15km, however woodland and surrounding built form south of the A96 will reduce actual visibility further - not considered further
Recreational Routes	
Dava Way (Core Path and promoted long-distance route)	Widespread theoretical visibility from parts of the route within 15km - considered further
Speyside Way	No theoretical visibility - not consider further
NCN 1	Some theoretical visibility within 15km - considered further

Future Baseline

- 5.68 In the absence of the proposed development, it is likely that the land will continue under the same land use, and the character of the site is therefore unlikely to change notably. However, the surrounding landscape and visual amenity is likely to be influenced by a number of ‘forces for change’. 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.
- 5.69 The Landscape Institute’s Position Statement on Climate Change¹⁵ acknowledges that changes in average temperatures, precipitation and extreme weather events will have an effect on the landscape. However, whilst a change in rainfall and rising temperatures are anticipated, it is not considered that this will appreciably change the baseline landscape conditions.
- 5.70 Wind farm development is a clear force for change and is likely to continue. There are currently eleven operational wind farms in the study area and consent has been granted for a further three wind farms. There are also a considerable number of proposals for further wind farms. Given the wind resource in this area, there is likely to be ongoing interest in wind farm development in this part of the Highlands and Morayshire, particularly in the upland areas.

- 5.71 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.

Cairn Duhie Wind Farm Design Considerations

- 5.72 Landscape and visual considerations, including the appearance of the proposed development from key viewpoints, played a key role in the progression of the layout design. Consideration was given to the location of the turbines, as well as all ancillary infrastructure. Best practice guidance, including SNH’s Siting and Designing Wind Farms in the Landscape (2017) was considered throughout the design process. The development of the proposed turbine layout is discussed in detail in **Chapter 3: Design Evolution and Alternatives**. This includes the embedded mitigation which has been achieved through the development of the layout and design of all aspects of the proposed development.
- 5.73 Further commitments which have been made to reduce landscape and visual effects, such as the protection of vegetation and restoration of disturbed areas after construction are detailed in the outline Construction and Decommissioning Environmental Management Plan (CDEMP) contained in Appendix 4.2.

Micrositing

- 5.74 Micrositing of turbines (up to 50m as specified in **Chapter 4: Development Description**) is considered unlikely to result in changes to predicted landscape or visual effects, and therefore will not materially affect the findings of this assessment.

Likely Significant Landscape Effects

- 5.75 The assessment of landscape effects follows the methodology presented in Appendix 5.1 and is based upon the development description outlined in **Chapter 4: Development Description**. The LVIA reports on construction and operational effects separately.

Construction Effects

Sources of Effects During Construction

- 5.76 During the proposed 15 months construction phase, there will be potential short-term landscape effects arising from the presence of partially constructed infrastructure and construction activities on the site (as described in **Chapter 4: Development Description**). Effects occurring during the construction phase are considered to be reversible unless otherwise stated.

¹⁵ Landscape Institute (2008) Landscape architecture and the challenge of climate change: Position Statement

5.77 The changes arising from the construction of the proposed development, as outlined in **Chapter 4: Development Description**, will include:

- The introduction of construction activity and vehicular/personnel movements around the site and on local roads;
- The creation of a borrow pit and extraction of material;
- The felling of approximately 0.27 ha of trees, located near Turbines 1, 2, 7, and 11 and around the site entrance, and replanting of approximately 2.4 ha of native Scots Pine and Birch woodland around the substation compound and site entrance to provide screening (refer to Woodland & Scattered Tree Management Layout on Figure 4.17);
- The disturbance of areas of land and surface vegetation at the locations of the borrow pits and other ancillary elements, turbine bases and along the access track routes;
- Construction of two new temporary construction compounds;
- The creation of a borrow pit and extraction of material;
- The creation of site access tracks, including passing places, turning heads, junctions and drainage;
- Construction of the new control building and substation compound;
- Construction of the new battery storage compound;
- Construction of turbine foundations;
- Construction of crane hardstandings and laydown/storage adjacent to each turbine;
- Excavation of trenches and laying of electrical and control cables adjacent to the access tracks connecting the turbines to the control building;
- The introduction of tall vertical structures (turbines and anemometer masts) and the use of cranes;
- Testing and commissioning of site equipment including wind turbines;
- The need for lighting during construction if work extends into hours of darkness; and
- Site restoration (including restoration of disturbed moorland vegetation and tree planting).

Landscape Effects During Construction

5.78 Potential effects on the landscape character and resources of the site during construction are set out in Table 5.8 below.

Table 5.8: Effects of Construction on The Site

Effects of Construction on The Site	
Baseline Description	<p>The site extends across largely open moorland plateau and is part of a large-scale and expansive landscape which forms the gradual transition from the high mountains of the Cairngorms to the low coastal landscape.</p> <p>The site rises to its highest point at Cairn Duhie (312m AOD), with land sloping down from it in all directions. Landcover comprises open heather and grass moorland, with scattered trees and areas of blanket bog (for further information see Chapter 7: Ecology).</p> <p>There are also a number of minor watercourses including the Stripe</p>

Effects of Construction on The Site	
	<p>of Muckle Lyne and the Stripe of Little Lyne in the north area of the site, and a burn in the south area of the site that drains into the Burn of Lochantùtach to the east. Part of Lochan Tùtach is included within the site.</p> <p>The turbines are proposed within the Open Rolling Upland (291) LCT. Access to the site will be via the western side from the A939. The influence of human activity is apparent on and around the site, through the surrounding A road network; coniferous forest cover (and forest operations in a small area in the north-west part of the site and larger areas to the north of the site); and the large steel tower overhead line that runs through the northern part of the site.</p>
Sensitivity (susceptibility and value)	<p>Given the current moorland nature and large-scale character of the site, the susceptibility of the site to development is judged to be medium.</p> <p>The site is not designated however, it borders the Drynachan, Lochindorb and Dava Moors SLA to the south-west, and sits adjacent to a recognised tourist route (A939)¹⁶. The site is therefore judged to be of medium value.</p> <p>Judgements: Susceptibility - medium; Value - medium; Sensitivity - medium.</p>
Magnitude of change (size and scale, geographical extent, duration and reversibility)	<p>Construction activities will result in direct landscape effects on the site. Changes primarily relate to excavations and track construction; localised areas of woodland and some tree felling; the presence of tall cranes and partially built towers whilst turbines are being erected; and construction activity including the movement of construction vehicles and plant and construction compounds and storage areas. There will therefore be large scale changes to the site relating to construction activity including the removal/clearance of features and disturbance to landcover (moor and blanket bog); introduction of new features (turbines and infrastructure); additional movement and activity through construction vehicles and plant; as well as a perceived change from largely undisturbed open moorland and blanket bog to an active construction site. Site access will be taken via the A939, to the west of the site, and there will be some localised disturbance associated with vegetation clearance and earthworks to provide level access to the site. There will also be a temporary link track, between the B9007 and the A939, to the south of its junction at Ferness, with associated disturbance to vegetation cover (pastoral field) and the landform. Transient effects on residents to the south of Ferness, as a result of construction traffic using this link road, will also be experienced. The size and scale of effect on the site is therefore judged to be large.</p> <p>The geographic extent of these changes will be at the site level and is therefore judged to be small. The construction works are expected to last approximately 15 months, so will be temporary and short term. The level of reversibility will be varied, from fully reversible changes associated with ground disturbances (albeit that vegetation will take some time to recover) to irreversible infrastructure that forms part of the operational scheme.</p>

¹⁶ The A939 is part of the Highland Tourist Route described on the VisitScotland website

Effects of Construction on The Site	
	Given the large size/scale of effect, small geographical extent, short-term and reversible to irreversible nature of effects, overall the magnitude of change is judged to be high . Judgements: Scale - large; Geographical Extent - small; Duration - short term; Reversibility - fully reversible to irreversible; Magnitude of Change: high
Effect and Significance	Overall, the effect of construction on the site is judged to be moderate (significant) . These effects will be temporary and largely contained within the geographical extent of the site.

Mitigation During Construction

5.79 Measures such as arrangements for vegetation and soil removal, storage and replacement and the restoration of disturbed areas after construction are detailed in the outline Construction and Decommissioning Environmental Management Plan (CDEMP) contained in Appendix 4.2, which includes reference to Construction Method Statements.

Residual Construction Effects

5.80 Re-establishment of vegetation will take approximately three to five years, depending on the vegetation and soils, and levels of effect (in relation to disturbance to landcover experienced during the construction phase) will decline over this period.

Operational Effects

Sources of Effects During Operation

5.81 The main potential effects of the proposed development on the landscape once operational will be associated with the presence of the wind turbines, turbine transformers and related development including access tracks, onsite substation and main site access track as described in **Chapter 4: Development Description** and shown on Figures 4.1 to 4.16.

5.82 The key components of the proposed development of relevance to this assessment include:

- 16 wind turbines (including internal transformers) of up to 149.9m to blade tip, further information is provided in **Chapter 4: Development Description**;
- Hardstanding areas at each turbine location, for use by cranes and maintaining the turbine;
- Underground electrical cables located in trenches adjacent to access tracks;
- An onsite control building and substation compound located in the north of the site at 297802, 844325;
- A battery storage compound;
- Vehicle turning heads and junctions;
- Approximately 8.3km of new permanent access tracks including nine passing places;
- Main site access track from the A939; and
- Aviation safety lighting (Aviation Lighting Assessment provided in Appendix 5.4).

Landscape Effects During Operation

5.83 This section describes the operational effects resulting from the proposed development on the landscape fabric of the site and the LCTs which have been identified as requiring detailed consideration in Table 5.3. All operational effects are judged to be **long term and reversible**, unless specified otherwise.

Effects on the Site

Table 5.9: Effects of Operation on The Site

Effects of Operation on The Site	
Baseline Description	The site is described above in Table 5.8.
Sensitivity (susceptibility and value)	Judgements are explained above in Table 5.8: Susceptibility - medium; Value - medium, Sensitivity - medium
Magnitude of change (size and scale, geographical extent, duration and reversibility)	The introduction of the proposed development will substantially alter the character of the site, through the change from open largely undisturbed moorland to a wind power generating site with turbines and infrastructure including tracks. The access track junction with the A939 will also be visible from the western flank of Cairn Duhie within the site. The margins of the tracks will in time grow over with vegetation, softening their appearance in the landscape. The substation will be visible from parts of the site. Over time as new woodland planting (Woodland & Scattered Tree Management Layout on Figure 4.17) around the substation matures it will help to screen this feature. The size and scale of effect on the site is therefore judged to be large . The geographical extent of these changes will be at the site level and is judged to be small . Given the large size/scale of effect, small geographical extent, long-term and reversible nature of effects, overall the magnitude of change is judged to be high . Judgements: Scale - large; Geographical Extent - small; Duration - long-term; Reversibility - reversible; Magnitude of Change: high
Effect and Significance	Overall, the effects of the wind farm on the landscape of the site is judged to be major (significant) .

Effects on Landscape Character Types

5.84 The following tables provide a detailed assessment of effects on LCTs which have been carried forward for detailed assessment, as set out in Table 5.3. LCTs are illustrated on Figure 5.1.4a, with theoretical visibility from those LCTs indicated by the ZTV shown on Figure 5.1.4b. The assessment describes the potential effects on landscape character resulting from the introduction of the proposed development during the operational phase. The LCTs have been assessed using SNH's (2019) National Landscape Character Assessment, however the

assessments have also been informed by the Moray Council (2017) Moray Wind Energy Capacity Study which uses the previous LCT names, prior to SNH's 2019 assessment.

Table 5.10: Open Rolling Upland (291) LCT

Open Rolling Upland (291) LCT	
Baseline	<p>The Open Rolling Upland (291) LCT comprises simple and expansive rolling heather moorland, bog and grasslands. There are two areas of this LCT, which are separated by the Upland Valleys - Moray & Nairn (294) LCT. The site lies within the larger of the two areas, located to the east of the Findhorn River Valley, whilst the other area is located within 10km to the west of the site. Key characteristics of relevance include:</p> <ul style="list-style-type: none"> • <i>“High, rolling moorland with gentle gradients and limited relief in the west becomes hillier in the eastern reaches;</i> • <i>Simple, rolling landscape of heather moorland and grassland, with few plantations or structures, and the contrasting setting it provides for the occasional farmed valleys at the margins and close to roads;</i> • <i>Interest provided by occasional natural and built point features in the simple landscape, such as lochans, summits, small farms, stone bridges, crofts and abandoned shielings;</i> • <i>General lack of modern structures (pylons, wind turbines, masts and houses), particularly in the central area close to roads and the Dava Way, from where most people experience the area. However due to the openness of this landscape there are views to commercial wind energy development in neighbouring areas to the east;</i> • <i>Elevated, open and expansive views across the landscape, and long distance views from the edge of the plateau to the north and south. Difference in extent and focus of views between east and west; and</i> • <i>Sense of remoteness from lack of roads and built development, coupled with abandoned buildings, rail lines and historic roads.”¹⁷</i> <p>For this LCT (previously known as Open Rolling Uplands (11)), the Moray Wind Energy Landscape Capacity Study (2017) notes a high-medium sensitivity to wind energy development of this size.</p> <p>This LCT contains a number of operational wind farm developments including Tom nan Clach, Berry Burn and Paul's Hill. Hill of Glaschyle is visible from parts of this LCT in views to the north-east, and Rothes Phase 1 and Rothes Phase 2 are visible in more distant views to the north-east. Moy is also visible from this LCT in views to the west. An overhead transmission line is present in this LCT and crosses the northern part of the site.</p>

Open Rolling Upland (291) LCT	
Sensitivity (susceptibility and value)	<p>This is a large scale and simple landscape with undulating moorland and gently sloping hills, with open and expansive views and broad horizons. Certain hills located on the fringes of this LCT act as local landmarks, such as the Knock of Braemoray. Skylines are broad and expansive with open long distant views, however the influence of human activity is readily apparent due to the presence of existing wind farm developments that can be seen across parts of the skyline. The overhead transmission line which crosses through this LCT also increase human influences. Given the large-scale and simple undulating landform of this LCT and the presence of existing of wind farms, overall, the susceptibility of this LCT to wind farm development is medium.</p> <p>A large area of the LCT lies within the Drynachan, Lochindorb and Dava Moors SLA. The southern boundary of the eastern area of the LCT (east of the Findhorn River Valley) borders the CNP, located immediately south of the LCT. Overall the LCT is therefore considered to be of high value.</p> <p>Taking into consideration the medium susceptibility and high value, overall sensitivity is judged to be high.</p> <p>Judgements: Susceptibility - medium; Value - high, Sensitivity - high</p>
Magnitude of change (size and scale, geographical extent, duration and reversibility)	<p>The turbines of the proposed development will be located within the area of LCT to the east of the Findhorn River Valley, bounded by the A939 to the west, the A940 to the east and an overhead transmission line (running east-west) to the north of the site. The proposed development will introduce turbines into the site area and will have direct effects on the landscape character of the site. The site will change from an area of open rolling moorland, with some forestry and scattered trees, to an area of open rolling moorland, with some forestry and scattered trees and wind turbines. The impacts on the site are considered in more detail in Table 5.9 above.</p> <p>Beyond the site boundary, theoretical visibility of the turbines will be extensive within approximately 5km, with turbines visible from the open moorland areas between the A939 and the A940. The proposed development will be seen in closer proximity views from stretches of the A939 and A940 as well in views from the summit of Knock of Braemoray to the east of the site, and the Hill of Aitnoch to the south-west of the site. From these areas, the turbines will form larger elements with both vertical emphasis and movement. Whilst localised areas of coniferous forestry and broadleaved trees, including along stretches of the A940, will slightly reduce actual visibility (and the associated effects on the wider perceptual qualities of this LCT) many of the views across this landscape are quite open in nature.</p> <p>Beyond 5km, the proposed development will increase the presence of wind farms within the LCT, albeit as a separate group of turbines between Berry Burn and Paul's Hill Wind Farms to the east and Tom nan Clach Wind Farm to the south-west. Potential visibility will extend 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 north-east facing slopes to the west of the Tomlachlan Burn up to</p>

¹⁷ SNH (2019) National Landscape Character Assessment, Landscape Character Type 291, Open Rolling Upland

Open Rolling Upland (291) LCT	
	<p>Tom nan Clach and Carn an t-Sean Liathanaich (to the south-west of the site).</p> <p>The turbines will also be visible from the far side of the River Findhorn valley, on the east facing slopes up to Carn nan Trigtighernan (west of the site). From these areas, the proposed development will typically form a discrete group of turbines in medium to longer distance views. From the areas around Carn Kitty, the proposed development will be more distant than Berry Burn Wind Farm, seen in close-proximity views. From areas to the south-west and west of the site, the proposed development will be seen in closer proximity than operational wind farms to the east. Tom nan Clach Wind Farm is likely to be visible in successive views to the south and south-west. As such, the proposed development is likely to further slightly reduce the sense of remoteness as experienced across wider parts of this landscape character type, but noting that operational wind farms are already part of the baseline, with associated effects on the remote perceptual qualities of this landscape.</p> <p>Overall, the size and scale of effect is judged to be large for areas of the LCT within 5km of the site, reducing with distance from the site.</p> <p>The overall geographical extent is judged to be medium as visibility will be widespread from this LCT within 5km. Beyond 5km from the site, the availability of views will reduce due to the screening provided by the undulating upland landform and areas of coniferous forest and native woodland.</p> <p>Judgements: Scale - large (within 5km) and reducing with distance; Geographical Extent -medium; Duration - long-term; Reversibility - reversible; Magnitude of Change: medium-high (within 5km) and medium-low (beyond 5km)</p>
Effect and Significance	Overall, the effect of the proposed development on this LCT is judged to be moderate (significant) within 5 km of the site and minor (not significant) for the rest of the LCT.

Table 5.11: Narrow Wooded Valley - Moray & Nairn (286) LCT

Narrow Wooded Valley - Moray & Nairn (286) LCT	
Baseline	<p>The Narrow Wooded Valley - Moray & Nairn (286) LCT comprises the middle reaches of the Findhorn River Valley with narrow gorges and woodland and forest cover, and is located within 5km of the site to the north and west. Key characteristics of relevance include:</p> <ul style="list-style-type: none"> • <i>“Variety of natural geological features in and around the course of the river, the narrow gorges, coupled with the fast-moving, natural flow, pools, falls and occasional inaccessible gravel and sand beaches;</i> • <i>Diversity of species and ages of woodland, forest cover and trees, mixed with pockets of pasture;</i>

Narrow Wooded Valley - Moray & Nairn (286) LCT	
	<ul style="list-style-type: none"> • <i>Strong sense of history provided by the continuation of farming and forest management practices by estates, the presence of historic buildings and relicts, the many large, ancient trees, and the lack of major new developments or detracting structures;</i> • <i>Winding, often narrow roads, following the land form, and crossing the river in enclosed niches over historic, small-scale stone bridges; and</i> • <i>Shelter and seclusion provided by intricate, enclosed landform, woodland cover and general lack of roads and river crossings.”¹⁸</i> <p>For this LCT (previously known as Narrow Wooded Valleys (6)), the Moray Wind Energy Landscape Capacity Study (2017) notes a high sensitivity to wind energy development of this size.</p> <p>There are no wind farm developments in the LCT however, there are some wind farms outside that are visible, including Rothes Phase 1 and Rothes Phase 2, Paul’s Hill and Berry Burn to the east from areas with open views to the surrounding uplands. Tom nan Clach and Moy wind farms are also visible in open views to the west. Views of operational wind farms however are limited and generally screened by broadleaved woodland and coniferous forestry, as well as areas of deeply incised landform.</p>
Sensitivity (susceptibility and value)	<p>The is a small-scale landscape with a distinctive narrow and incised valley landform; intimate and enclosed views; and diverse mix of native woodland and policy woodland, as well as coniferous forestry. Despite a lack of major new development, human activity is already apparent in the LCT, including the overhead transmission line which crosses the LCT and the site (east-west), which is a prominent vertical feature in views from parts of the LCT. This is a small-scale landscape with an enclosed character. Woodland within the LCT screens many outward views and the presence of the overhead transmission line increases human influence over the LCT. Overall the susceptibility of this LCT to wind farms is judged to be high.</p> <p>Parts of the LCT are within the locally designated Findhorn Valley and the Wooded Estates SLA at the northern extent of the LCT. The southern tip of the LCT lies within the Drynachan, Lochindorb and Dava Moors SLA. The LCT includes a number of visitor attractions including Ardclach Bell Tower. Overall the LCT is therefore considered to be of high value.</p> <p>Taking into consideration the medium susceptibility and high value, overall sensitivity is judged to be high.</p> <p>Judgements: Susceptibility - high; Value - high, Sensitivity - high</p>
Magnitude of change (size and scale, geographical extent, duration and reversibility)	<p>There will be no direct effects on the landscape features of the LCT. Within 5km, there will be widespread theoretical visibility of the proposed development, including along stretches of the B9007. The deeply incised river valley will offer some visual shading. Coniferous forest and broadleaved woodland will further reduce actual visibility. From the limited areas where views will be</p>

¹⁸ SNH (2019) National Landscape Character Assessment, Landscape Character Type 286, Narrow Wooded Valley – Moray & Nairn

Narrow Wooded Valley - Moray & Nairn (286) LCT	
	<p>available, they are likely to be glimpsed through breaks in woodland and coniferous forest. In more open areas, views will tend to be longer distance, where views towards the surrounding uplands (and operational wind farm development) are more likely. As such, the size and scale of effect is therefore judged to be small.</p> <p>The geographical extent is judged to be small as views will be localised to areas where there are gaps in surrounding woodland and forestry.</p> <p>Given the small size/scale of effect, small geographical extent, long-term and reversible nature of effects, overall the magnitude of change is judged to be low.</p> <p>Judgements: Scale - small; Geographical Extent - small; Duration - long-term; Reversibility - reversible; Magnitude of Change: low</p>
Effect and Significance	Overall, the effect of the proposed development on this LCT is judged to be minor (not significant) .

Table 5.12: Upland Moorland and Forestry (290) LCT

Upland Moorland and Forestry (290) LCT	
Baseline	<p>The Upland Moorland and Forestry (290) LCT comprises expansive broad, rounded hills that form a transition zone between the open upland landscape to the south and the forested and farmed landscape to the north. There are two areas of this LCT, which are separated by the Narrow Wooded Valley - Moray & Nairn (286) LCT, located within 5km to the west and north-east of the site. Key characteristics include:</p> <ul style="list-style-type: none"> • <i>“Widely spaced, broad, rounded hills and upland plateaux with smooth, even, gentle slopes;</i> • <i>Generally simple, large scale landscape with expansive scale of interior plateau area;</i> • <i>More defined, higher hills on edge of the interior plateau, forming landmark features from the adjacent lower lying landscapes to the north and south and providing a backdrop to these;</i> • <i>Predominantly simple landcover of extensive, geometric conifer forests and heather moorland;</i> • <i>Large expanses of un-settled areas, with settlement very sparsely scattered near the very few roads;</i> • <i>Largely inaccessible core area with relatively limited visibility in from surrounding landscapes;</i> • <i>Regenerating native trees and lone pine trees in moorland areas;</i> • <i>Wind farm development both within the Landscape Character Type and in adjacent landscapes; and</i> • <i>Extensive views out of this landscape, through gaps in the forestry cover, to the north and to the south from elevated areas.”¹⁹</i>

Upland Moorland and Forestry (290) LCT	
	<p>For this LCT (previously known as Upland Moorland and Forestry (10)), the Moray Wind Energy Landscape Capacity Study (2017) notes a high-medium sensitivity to wind energy development of this size.</p> <p>There are a number of operational wind farms in this LCT, including Hill of Glaschyle, Rothes Phase I and Rothes Phase II. Wind farms outside the LCT are also visible in views to the south, including Berry Burn and Paul’s Hill. There are also small areas where Tom nan Clach and Moy wind farms are visible to the south-west.</p>
Sensitivity (susceptibility and value)	<p>This is a large-scale and simple upland landscape with broad undulating landform and more defined and higher hills, such as Mille Buie, with landcover predominantly comprising heather moorland and large-scale conifer forests. The influence of human activity is readily apparent, particularly with the presence of existing wind farm developments and forestry in the LCT. Given the large-scale and simple nature of this LCT, along with the presence of existing wind farms. Overall the susceptibility of this LCT is judged to be low.</p> <p>A very small area of the eastern area of the LCT (to the east of the River Findhorn valley) lies within the locally designated Findhorn Valley and the Wooded Estates SLA, as well as the north-westerly fringes of The Spey Valley SLA. Overall the LCT is considered to be of medium value.</p> <p>Taking into consideration the low susceptibility and high value, overall sensitivity is judged to be medium.</p> <p>Judgements: Susceptibility - low; Value - medium, Sensitivity - medium-low</p>
Magnitude of change (size and scale, geographical extent, duration and reversibility)	<p>There will be no direct effects on the landscape features of the LCT. The proposed development will be theoretically visible from both areas of this LCT areas, including from sections of the minor road network which passes through this landscape. Coniferous forest cover will notably reduce actual visibility of the turbines. Furthermore, where views of the proposed development are available from the western area of the LCT (to the west of the River Findhorn valley), it will 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. From the eastern area of the LCT (to the east of the River Findhorn valley), the proposed development will be apparent from the open site facing hill flanks of Mill Buie. The proposed development will form an additional group of turbines visible in the wider landscape to the south of the LCT, seen in the context of existing wind farms both within and outside this area. The size and scale of effect is therefore judged to be small.</p> <p>The geographical extent is judged to be small as views will be localised due to the presence of coniferous forest.</p> <p>Given the small size/scale of effect, small geographical extent, long-term and reversible nature of effects, overall the magnitude of change is judged to be low.</p> <p>Judgements: Scale - small; Geographical Extent - small; Duration - long-term; Reversibility - reversible; Magnitude of Change: low</p>

¹⁹ SNH (2019) National Landscape Character Assessment, Landscape Character Type 290, Upland Moorland and Forestry

Upland Moorland and Forestry (290) LCT	
Effect and Significance	Overall, the effect of the proposed development on this LCT is judged to be minor (not significant) .

Table 5.13: Rolling Farmland and Forests - Moray & Nairn (285) LCT

Rolling Farmland and Forests - Moray & Nairn (285) LCT	
Baseline Description	<p>The Rolling Farmland and Forests - Moray & Nairn (285) LCT is a transitional landscape that lies between the coastal plain of the coastal farmlands to the north and the uplands to the south. The LCT comprises mainly undulating landform, with rolling forested hills, valley landscapes and ribbons of broadleaved woodland along watercourses. There are two areas of this LCT, both of which are located to the north of the site within 5 - 10km, separated by the Narrow Wooded Valley - Moray and Nairn (286) LCT. Key characteristics include:</p> <ul style="list-style-type: none"> • <i>“Low to mid elevation, undulating landform with rolling, gently rounded, sometimes steep-sided hills, and broad and narrow valleys containing mainly natural, meandering courses of rivers and burns and associated ribbons of broad leaved woodland;</i> • <i>Prominent major hills and their forested tops and slopes, and occasionally steep sides, combined with farmed, wooded and intimate valleys;</i> • <i>Rich and varied texture of the landscape as a result of the rolling landform, mosaic of farmland and tree cover, mixed with historic buildings and ruins, vernacular estate and farm buildings;</i> • <i>Winding rural roads that respond to the landform and winding river valleys and numerous tributaries which run down and through this landscape from the elevated plateau to the south;</i> • <i>High proportion of connected tree cover, consisting of mixed conifers and broadleaves, in small to large plantations, woodlands, road side trees and tree belts, with many large and ancient trees associated with older forests and policy plantings;</i> • <i>Mix of pasture and arable in irregular shaped fields, often edged with banks and stone walls, gorse and remnant trees; and</i> • <i>Long distance views across the Firth, to the coasts and mountains of the north, and occasionally to the south, afforded from high points and roads descending from higher ground.”²⁰</i> <p>Prior to the SNH (2019) LCA, this LCT was previously split across three different LCTs within the Moray Wind Energy Landscape Capacity Study (2017). The LCT now captures the Rolling Farmland and Forests (5) LCT, Rolling Farmland and Forests with Valleys (5A)</p>

Rolling Farmland and Forests - Moray & Nairn (285) LCT	
	<p>LCT, and Rolling Farmland and Forests with Low Hills (5B) LCT. The Moray Wind Energy Landscape Capacity Study (2017) notes a high sensitivity to wind energy development of this size for each of the previous LCTs, resulting in a high sensitivity overall for this LCT. Commercial scale operational wind farms within this LCT are limited. However, some wind farms outside the LCT are visible including Rothes Phase I and II which appear as a larger group in views to the south, as well as Hill of Glaschyle, Paul’s Hill and Berry Burn also in views to the south, from certain areas with open views in that direction. There is also intermittent visibility of Tom nan Clach and Moy wind farms from this LCT, seen in views to the south-west.</p>
Sensitivity (susceptibility and value)	<p>This is a small-scale landscape that has a complex and contrasting landform, with undulating slopes, steep valleys and hill sides, and low rolling hills. The LCT has many intimate views, and a range of different landscape mosaics formed by fields, hills, valleys and woodland. Human activity is readily apparent, with the presence of farm buildings, and more modern dwellings, as well as existing wind farm development in the wider landscape within other nearby LCTs. Given the complex landscape with the presence of existing human features, including views of existing wind farm development in neighbouring LCTS, the susceptibility of this LCT is judged to be medium.</p> <p>The LCT contains a small number of locally designated landscapes, including the Pluscarden Valley SLA, located in the easterly of the two LCT areas, the Quarrelwood SLA to the north-east, and parts of the Findhorn Valley and the Wooded Estates SLA which extends into both areas of this LCT as it crosses the Narrow Wooded Valley - Moray and Nairn (286) LCT. Overall the LCT is therefore considered to be of high value.</p> <p>Taking into consideration the medium susceptibility and high value, overall sensitivity is judged to be high.</p> <p>Judgements: Susceptibility - medium; Value - high, Sensitivity - high</p>
Magnitude of change (size and scale, geographical extent, duration and reversibility)	<p>There will be no direct effects on the landscape features of the LCT. The proposed development will be theoretically visible from parts of the LCT between Littlemill and Achindown, as well as intermittent areas around Logie, Rafford and the around the Findhorn Valley. However, coniferous forestry, woodland and undulating terrain will reduce actual visibility. Where views are available, these tend to be open, expansive and longer distance. Furthermore, many of these views have typically been altered by existing wind farm developments on the hills to the south including turbines within the Rothes Phase I and II and Hill of Glaschyle wind farms, which are seen in closer proximity in view to the south, from the eastern area of the LCT. Key long distance views across the Forth to the north will also remain unaltered. The size and scale of effect is therefore judged to be small.</p>

²⁰ SNH (2019) National Landscape Character Assessment, Landscape Character Type 285, Rolling Farmland and Forests – Moray & Nairn

Rolling Farmland and Forests - Moray & Nairn (285) LCT	
	<p>The geographical extent is judged to be small due to views of the proposed development being localised to areas where there are gaps in the pattern of coniferous forest, allowing views towards the uplands.</p> <p>Given the small size/scale of effect, small geographical extent, long-term and reversible nature of effects, overall the magnitude of change is judged to be low.</p> <p>Judgements: Scale - small; Geographical Extent - small; Duration - long-term; Reversibility - reversible; Magnitude of Change: low</p>
Effect and Significance	Overall, the effect of the proposed development on this LCT is judged to be minor (not significant) .

Table 5.14: Coastal Farmlands - Moray & Nairn (284) LCT

Coastal Farmlands - Moray & Nairn (284) LCT	
Baseline Description	<p>The Coastal Farmlands - Moray & Nairn (284) LCT is located in the north of the study area, extending from Inverness in the west to Fochabers in the east.</p> <p>It is a flat to undulating coastal agricultural landscape, which is open and expansive. Key characteristics include:</p> <ul style="list-style-type: none"> • <i>“Expansive, open, flat to undulating coastal plain landscape;</i> • <i>Predominantly simple agricultural landscape, punctuated by stone built farms and villages;</i> • <i>Conifer plantations which coalesce to create elongated bands of dark colour contrasting strongly with the paler colours of arable land;</i> • <i>Broadleaf woodlands and shelterbelts associated with gardens and designed landscapes;</i> • <i>Established main communication routes of rail and trunk roads linking the larger settlements, off which run the network of minor rural roads;</i> • <i>Prominence of occasional built elements in a relatively flat, open landscape, particularly large or vertical structures, including grain silos and single and small groups of commercial turbines associated with larger farms; and</i> • <i>Expansive, open long-distance views along the farmland belt, up to the moorland hills, and occasional views to the sea, mixed with more intimate views, foreshortened by undulations and folds in the landform, tree groups, small forests and coastal forests.”²¹</i> <p>For this LCT (previously known as Coastal Farmland (4)), the Moray Wind Energy Landscape Capacity Study (2017) notes a high-medium sensitivity to wind energy development of this size.</p> <p>Existing wind farm development typically comprises domestic-scale single turbines and small clusters of turbines. Other wind farms outside this LCT are visible from parts of it including Hill of</p>

Coastal Farmlands - Moray & Nairn (284) LCT	
	<p>Glaschyle, Berry Burn and Paul’s Hill to the south; and Rothes Phase I and II which appear as a larger group in views to the south. In the western area of the LCT, there is intermittent visibility of Tom nan Clach and Moy wind farms in views to the south.</p>
Sensitivity (susceptibility and value)	<p>This is a large-scale landscape that lacks strong topographical variety due to its flat coastal nature. The influence of human activity is readily apparent with an existing presence of vertical structures. Overall the susceptibility of this LCT to wind farms is judged to be medium.</p> <p>Parts of the LCT are within locally designated SLAs including the Sutors of Cromarty, Rosemarkie and Fort George SLA at the western end of the LCT, although this SLA is focused on the Moray Firth. The eastern fringes of the LCT are within the Culbin to Burghead Coast SLA, Burghead to Lossiemouth SLA, Findhorn Valley and the Wooded Estates SLA, and the Cluny Hill SLA and Spynie SLA are located within it. Whilst many of these SLAs have a stronger relationship with the coast, overall the LCT is considered to be of medium-high value.</p> <p>Taking into consideration the medium susceptibility and medium-high value, overall sensitivity is judged to be medium.</p> <p>Judgements: Susceptibility - medium; Value - medium, Sensitivity - medium</p>
Magnitude of change (size and scale, geographical extent, duration and reversibility)	<p>There will be no direct effects on the landscape features of the LCT. The proposed development will be theoretically visible from stretches of the A96 and around Forres and Nairn, as well as an area around Ardersier on the western extent of the LCT, within 15km. Woodland and forest cover (including shelterbelts), built form and local undulations in the terrain will reduce actual visibility. Where views are available, they are likely to be long distance and more expansive and where wind farm development on the moorland hills to the south is already apparent. The size and scale of effect is therefore judged to be small.</p> <p>The geographical extent is judged to be medium-small as views are localised to long-distance views from areas of open farmland and transport routes.</p> <p>Given the small size/scale of effect, medium-small geographical extent, long-term and reversible nature of effects, overall the magnitude of change is judged to be low.</p> <p>Judgements: Scale - small; Geographical Extent - medium-small; Duration - long-term; Reversibility - reversible; Magnitude of Change: low</p>
Effect and Significance	Overall, the effect of the proposed development on this LCT is judged to be minor (not significant) .

²¹ SNH (2019) National Landscape Character Assessment, Landscape Character Type 284, Coastal Farmlands – Moray & Nairn

Likely Significant Visual Effects

Construction Effects

Predicted Visual Effects

5.85 In terms of visual effects during the construction phase, beyond those experienced at the site level where low level construction activity will be apparent in certain views, these will largely relate to views of tall cranes and turbine construction experienced from the wider study area. These effects will be transient and change throughout the construction phase as wind turbines are gradually constructed in sections. As such, visual effects during the construction phase are unlikely to exceed the level of effect associated with operational visual effects.

Operational Effects

5.86 This section presents the assessment of effects of the proposed development on views and visual amenity for receptors identified across the study area.

Effects on Visual Receptors at Viewpoints

5.87 The assessment of visual effects from the 18 viewpoints selected to represent views of the proposed development are set out below. This assessment assumes that all effects are long-term, during the proposed 35-year operational lifespan of the proposed development, and reversible, unless stated otherwise.

5.88 Accompanying visualisations for each assessment viewpoint are contained in Volume 2 (SNH Visualisations) and Volume 3 (THC Visualisations) and were prepared in accordance with the methodology set out in Appendix 5.1 to both SNH and THC visualisation standards.

Table 5.15: Viewpoint 1 - A939 South of Ferness Village

Viewpoint 1 - A939 South of Ferness Village			
Grid Reference (NGR)	296974, 842878	Figure Number	5.2.1
LCT	Open Rolling Upland (291) LCT	Designated Landscape or Wild Land Area	None
Direction of View	South-east	Distance to Nearest Turbine (km)	0.42
<p>Location, description of existing view and potential receptors: This viewpoint is located on the A939 to the north-west of the site, immediately south of Ferness, and is representative of sequential views from the A939. The view towards the site is from the roadside and is close range, partially interrupted by roadside vegetation and broadleaved trees in the foreground. Gaps in roadside planting allow immediate views across the rough moorland within the site, with young coniferous trees scattered across the moorland in the foreground and across the horizon. To the right (south) of the view, a short stretch of the A939 is visible before it disappears behind the gorse and broadleaved trees that line either side of the road. To the south there are also glimpsed distant views of the Hill of Aitnoch through roadside trees. To the west there are open and longer distance views with forest and rough grassland covering the middle distance, and hills on the distant horizon apparent. Tom nan Clach Wind Farm is visible in distant views across a stretch of the horizon along hills to the south-west.</p> <p>Sensitivity: The viewpoint is on a the A939 which is a recognised tourist route used regularly by road users, including tourists travelling to and from the CNP. This view represents one of the first more open views as road users travel south from the village of Ferness. Views will be sequential, glimpsed through roadside vegetation, and oblique. Tourists at this viewpoint are therefore judged to have medium susceptibility to changes in views. The viewpoint represents users of the A939 which is a recognised tourist route and is therefore considered to be of high value. Taking account of the judgements of susceptibility and value, overall sensitivity is judged to be medium-high.</p> <p>Assessment of visual effects: Size and Scale: The proposed development will be seen at close range at a distance of 0.4km. All 16 turbine hubs and blades will be theoretically visible contributing to a large-scale change in the view. However, views will change as road users travel south depending on the level of screening roadside vegetation provides. The turbines will appear relatively spaced out across the view. There will be some overlapping of turbines, which will change due to the sequential nature of the view. In addition, access tracks to the north-west of the site within closer proximity to the viewpoint will be visible through gaps in roadside vegetation. The proposed development will be visible in successive sequential views with Tom nan Clach to the south-west. However, the turbines of the proposed development will be much closer, and appear larger, in comparison. The scale of change is judged to be large for receptors at this viewpoint. The geographical extent is judged to be small as similar views of the turbines will be experienced from a short section of the A939 as it passes to the west of the site.</p> <p>Effect and Significance: Overall, the magnitude of visual change during the operational phase will be high. The introduction of the proposed development will give rise to a major (significant) effect on receptors at this viewpoint.</p>			

Table 5.16: Viewpoint 2 - Little Aitnoch

Viewpoint 2 - Little Aitnoch			
Grid Reference (NGR)	297072, 840875	Figure Number	5.2.2
LCT	Open Rolling Upland (291) LCT	Designated Landscape or Wild Land Area	At the edge of the Drynachan, Lochindorb and Dava Moors SLA
Direction of View	North-east	Distance to Nearest Turbine (km)	1.1
<p>Location, description of existing view and potential receptors:</p> <p>This viewpoint is located on a minor road to the south-west of the site, near a property called Little Aitnoch. The viewpoint is representative of views from the minor road and property. Similar views can be obtained from the A939 adjacent to the site.</p> <p>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 woodland along field boundaries, 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 the A939, the ground rises over rough moorland with intermittent woodland towards the summit of the low conical hill of Cairn Duhie. To the left (north) of the view, forest covers the middle distant horizon. Higher, more distant hills can be seen to the south-east 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. Views are foreshortened to the south by the Hill of Aitnoch.</p> <p>The Hill of Glaschyle Wind Farm is visible as blade tips behind the summit of Cairn Duhie. Tom nan Clach Wind Farm is visible from sections of the minor road further west.</p>			
<p>Sensitivity:</p> <p>The viewpoint is on a minor road with relatively few viewers but is used to represent the residential property of Little Aitnoch. Residents are assumed to have high susceptibility to changes in views. Similar views will be experienced from the A939 which is a recognised tourist route. The view is therefore considered to be of high value.</p> <p>Taking account of the judgements of susceptibility and value, overall sensitivity is judged to be high.</p>			
<p>Assessment of visual effects:</p> <p>Size and scale: The proposed development will be seen on the moorland over Cairn Duhie, at a distance of 1.1km. 16 hubs and 16 turbine blades will be apparent above the horizon. The turbines will be seen as single irregularly spaced grouping with 13 turbines to the north (left) of the top of Cairn Duhie. There will be some overlapping of turbine blades within the group however, the towers will be well spaced. The turbines will appear 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 certain turbines will be visible, on the south-western flank of Cairn Duhie. The proposed development will be seen in front of the distant blade tips of the Hill of Glaschyle Wind Farm.</p> <p>The scale of change is judged to be large for receptors at this viewpoint. The geographical extent is judged to be small as this viewpoint represents views from the minor road and a section of the A939 to the south-west of the site.</p>			
<p>Effect and Significance:</p> <p>Overall, the magnitude of visual change during the operational phase will be high. The introduction of the proposed development will give rise to a major (significant) effect on receptors at this viewpoint.</p>			

Table 5.17: Viewpoint 3 - Hill track to Loch Kirkcaldy

Viewpoint 3 - Hill track to Loch Kirkcaldy			
Grid Reference (NGR)	295580, 842173	Figure Number	5.2.3
LCT	Open Rolling Upland (291) LCT	Designated Landscape or Wild Land Area	None
Direction of View	East	Distance to Nearest Turbine (km)	1.75
<p>Location, description of existing view and potential receptors:</p> <p>This viewpoint is located along the hill track that leads to Loch Kirkcaldy to the west of the site. The viewpoint is representative of views experienced by walkers using the track to access the loch. The view towards the site from the track is over a foreground of rough moorland and pockets of scattered coniferous trees, including some younger coniferous trees. Through the trees there are glimpsed views of Cairn Duhie. The higher more distant hill of Knock of Braemoray is visible above the trees, forming the backdrop in this view, along with the visible areas of Cairn Duhie.</p> <p>No wind farm developments are visible from this viewpoint.</p>			
<p>Sensitivity:</p> <p>The viewpoint is on a hill track with relatively few viewers but is used to represent the recreational receptors who use this track. Recreational users of this track are assumed to have medium susceptibility to changes in views.</p> <p>The track is used to access the scenic location of Loch Kirkcaldy however, the track is not a Core Path or a promoted walking route. It is therefore considered to be of medium value.</p> <p>Taking account of the judgements of susceptibility and value, overall sensitivity is judged to be medium.</p>			
<p>Assessment of visual effects:</p> <p>Size and scale: The proposed development will be seen across the low profile hill of Cairn Duhie to the east above the foreground trees, at a distance of 1.8km. At least 10 turbines in the southern half of the site will be clearly visible with both towers and blades visible, and seen as large-scale man-made structures in this view. The rest of the proposed development will be largely screened by the coniferous trees in the foreground views, however some blades and hubs of the turbines in the northern half of the site will be visible in glimpsed views through the trees, as well as some of the access tracks between and external transformers at the feet of certain turbines. This is a sequential view from the track so the level of visibility will change as walkers move along the track. The scale of change is judged to be large for receptors at this location. The geographical extent is judged to be small as these views represent a relatively small stretch of the hill track.</p>			
<p>Effect and Significance:</p> <p>Overall, the magnitude of visual change during the operational phase will be high. The introduction of the proposed development will give rise to a major (significant) effect on receptors at this viewpoint.</p>			

Table 5.18: Viewpoint 4 - Ferness

Viewpoint 4 - Ferness			
Grid Reference (NGR)	296246, 844818	Figure Number	5.2.4
LCT	Narrow Wooded Valley - Moray & Nairn (286) LCT	Designated Landscape or Wild Land Area	None
Direction of View	South-east	Distance to Nearest Turbine (km)	1.55
<p>Location, description of existing view and potential receptors: This viewpoint is located at the southern (downhill) end of the row of properties in 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 development than locations further north. This viewpoint is representative of views from the settlement and the properties therein. The view is from the B9007, the north-western side of which is occupied by a line of south-east facing properties. The view across the road is to a sloping field of rough grazing, up towards the A939 road, beyond which there is coniferous forestry on the horizon which contains the view. No wind farm developments are visible from this viewpoint.</p>			
<p>Sensitivity: This viewpoint represents residents in Ferness and users of the B9007. Residents are assumed to have high susceptibility to changes in views. Although the viewpoint represents residents of Ferness, it is not located within a designated landscape and does not have any recognised scenic value. It is therefore considered to be of medium value. Taking account of the judgements of susceptibility and value, overall sensitivity is judged to be high.</p>			
<p>Assessment of visual effects: Size and Scale: The proposed development will largely be screened from this viewpoint due to intervening coniferous forest south-east of the A939, whilst this remains in place. There will be some short term effects during the operational phase associated with the temporary link track as pastoral landcover in the field in the foreground recovers. This temporary track will link the B9007 with the A939, to the south of Ferness, during the construction phase. The scale of change is judged to be barely perceptible for receptors at this viewpoint due to screening by forest. The geographical extent is judged to be small as this viewpoint represents views that are localised to part of Ferness.</p>			
<p>Effect and Significance: Overall, the magnitude of change during the operational phase will be low. The introduction of the proposed development will give rise to a negligible (not significant) effect on receptors at this viewpoint.</p>			

Table 5.19: Viewpoint 5 - A940, above Kerrow

Viewpoint 5 - A940, above Kerrow			
Grid Reference (NGR)	300053, 841893	Figure Number	5.2.5
LCT	Open Rolling Upland (291) LCT	Designated Landscape or Wild Land Area	None
Direction of View	West	Distance to Nearest Turbine (km)	1.71
<p>Location, description of existing view and potential receptors: This viewpoint is located at a lay-by on the A940 on the western slopes of the Knock of Braemoray, at a point where the view overlooks Kerrow Farm to the west. The viewpoint represents sequential oblique views from the road and at a point where people stop along the A940. Local residences including Kerrow and other nearby properties such as Braemoray Lodge and Culfearn have similar views, but are at lower elevations. The view towards the site looks over a foreground of rough grassland and pasture that surrounds the Kerrow farm property, with woodland running along the small valley of the Dorback Burn. Plantation forestry is seen immediately beyond the woodland before moorland rises towards the Cairn Duhie summit. To the left (south) there are middle distance views of the Hill of Aitnoch. Beyond Cairn Duhie there are distant views of hills to the west, contributing to the distant horizon. Tom nan Clach Wind Farm is visible along hills in the distant horizon to the right of the Hill of Aitnoch.</p>			
<p>Sensitivity: This viewpoint is used to represent views of residents, tourists and road users along the A940. Residential receptors are assumed to have high susceptibility to changes in views. The A940 is a road used by tourists and is therefore considered to be of high value. Taking account of the judgements of susceptibility and value, overall sensitivity is judged to be high.</p>			
<p>Assessment of visual effects: Size and scale: The proposed development will be seen as an array of turbines at a distance of 1.7km at a similar elevation to the viewpoint. The proposed substation will be visible to the right of the most northerly turbine and ground level infrastructure including the access tracks will also be apparent. The proposed turbines will contribute to a large-scale change in the view spread north to south across the view to the west. 16 turbine hubs and blades will be visible. The array of turbines will be irregular with some overlapping of turbine blades and two turbine towers overlapping. However, given the sequential nature of this view the arrangement of turbines will change as road users move along the A940. Turbines will be seen to be much larger in scale than the pylons visible within the northern part of the site. The substation will be seen to be much smaller in scale compared to the turbines. Additionally, the planting of native trees around the substation will provide some screening as well as a planted backdrop for the substation when this planting matures, minimising visibility of this component further. The proposed development will be seen in combined views with Tom nan Clach Wind Farm along the horizon beyond, to the left (south-west) of the view. The scale of change is judged to be large for receptors at this viewpoint. The geographical extent is judged to be small as this viewpoint represents views from a localised area to the east of the site.</p>			
<p>Effect and Significance: Overall, the magnitude of visual change during the operational phase will be high. The introduction of the proposed development will give rise to a major (significant) effect on receptors at this viewpoint.</p>			

Table 5.20: Viewpoint 6 - A939, west of Aitnoch

Viewpoint 6 - A939, west of Aitnoch			
Grid Reference (NGR)	297997, 839720	Figure Number	5.2.6
LCT	Open Rolling Upland (291) LCT	Designated Landscape or Wild Land Area	At the edge of the Drynachan, Lochindorb and Dava Moors SLA
Direction of View	North	Distance to Nearest Turbine (km)	2.09
<p>Location, description of existing view and potential receptors: 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 north-east. 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 (looking north and outside the SLA). The view from this location is of the road crossing undulating moorland with areas of broadleaf woodland. To the west, the moorland rises up the slopes of the Hill of Aitnoch. To the north-east, the view is across a semi improved grazing field, with low woodland beyond. Beyond the woodland moorland rises gently, with some scattered trees on the lower ground, to the low top of Cairn Duhie to the north, and the Knock of Braemoray to the north-east. Between and beyond these hills lies distant lowland forest cover. The route of the A940 is visible as a horizontal line across the lower slopes of the Knock of Braemoray to the north-east. Berry Burn Wind Farm is visible beyond and to the right of the Knock of Braemoray, and two turbines of Paul's Hill are also visible in that direction. To the left of the Knock of Braemoray some hubs and blades within the Hill of Glaschyle Wind Farm are visible above the horizon.</p>			
<p>Sensitivity: The viewpoint represents road users and tourists along the A939. Similar views will be experienced by nearby residents. Although the views experienced by road users travelling along the A939 will be transitory, tourists on this route are assumed to have medium susceptibility to changes in views at this viewpoint. 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. Taking account of the judgements of susceptibility and value, overall sensitivity is judged to be medium-high.</p>			
<p>Assessment of visual effects: Size and scale: The proposed development will be seen across the low profile of Cairn Duhie at a distance of 2.1km. All 16 turbines will be visible above the horizon at varying degrees of visibility and will be seen as three irregularly spaced loose groups within a relatively compact overall array. There will be some overlapping of turbine blades and towers however, the arrangement will change as road users move along the A939. Due to the proximity of the viewpoint to the site, the turbines will appear as large elements in the view. The turbines will not interrupt 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 will be visible from this location, crossing the southern flank of Cairn Duhie. The proposed development will be seen in a combined view with some turbines within the Hill of Glaschyle Wind Farm, and in successive views with Berry Burn and the tips of two turbines within the Paul's Hill Wind Farm. The scale of change is judged to be large for receptors at this viewpoint. The geographical extent is judged to be small as views will be localised to the A939 corridor to the south of the site around Aitnoch.</p>			

Effect and Significance:

Overall, the magnitude of visual change during the operational phase will be high. The introduction of the proposed development will give rise to a **major (significant)** effect on receptors at this viewpoint.

Table 5.21: Viewpoint 7 - B9007, near Mount

Viewpoint 7 - B9007, near Mount			
Grid Reference (NGR)	298014, 846328	Figure Number	5.2.7
LCT	Narrow Wooded Valley - Moray & Nairn (286) LCT	Designated Landscape or Wild Land Area	None
Direction of View	South	Distance to Nearest Turbine (km)	2.39
<p>Location, description of existing view and potential receptors: This viewpoint is located on the B9007, on the stretch running between Ferness and Relugas, to the north of Mount. The viewpoint represents views from the north of the site, from a section of the B road with open framed views to the south. There are a number of scattered properties along this route from which views tend to be filtered/ obscured by woodland. 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 somewhat contained by forest cover to the east and west. The middle-distance horizon to the south is almost completely forested. No wind farm developments are visible from this viewpoint.</p>			
<p>Sensitivity: This viewpoint is on a minor road. Viewers at this location are judged to have medium susceptibility to changes in views. 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. Taking account of the judgements of susceptibility and value, overall sensitivity is judged to be medium.</p>			
<p>Assessment of visual effects: Size and scale: The proposed development will be seen as turbine blades over the middle distance forestry to the south, at a distance of 2.4km. Intervening forest cover will screen a large majority of turbines, however the hubs and blades of 4 turbines will be clearly visible above the forested horizon. Whilst intervening forest cover remains in place, the scale of the turbines may be difficult to discern for some viewers. Over time, the screening afforded by forest cover will change, as different plantation areas are felled or young trees grow up to screen the view. Based on the current level of screening the scale of change is judged to be medium, however, should forest felling open up views then this will increase. The geographical extent is judged to be small as views will be localised to short sections of the B9007.</p>			
<p>Effect and Significance: Overall, the magnitude of visual change during the operational phase will be medium-low. The introduction of the proposed development will give rise to a minor (not significant) effect on receptors at this viewpoint.</p>			

Table 5.22: Viewpoint 8 - Ardclach Bell Tower

Viewpoint 8 - Ardclach Bell Tower			
Grid Reference (NGR)	295388, 845321	Figure Number	5.2.8
LCT	Narrow Wooded Valley - Moray & Nairn (286) LCT	Designated Landscape or Wild Land Area	None
Direction of View	South-east	Distance to Nearest Turbine (km)	2.54
<p>Location, description of existing view and potential receptors: 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 6: Cultural Heritage. 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 due to woodland cover. The view from the bell tower is contained to the west and north by forest and woodland cover. To the south-east, 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 parts of the horizon beyond. Between this forestry there are glimpsed views of the Cairn Duhie site, along with the Hill of Aitnoch in middle distance views. A line of large pylons crosses the view on the far side of the valley, in front of the forest. From this viewpoint Tom nan Clach Wind Farm is visible in views to the south-west, as turbines extend above the hills along the horizon.</p>			
<p>Sensitivity: This viewpoint represents views seen by visitors to the Scheduled Monument, who are assumed to have high susceptibility to changes in views. 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. Taking account of the judgements of susceptibility and value, overall sensitivity is judged to be high.</p>			
<p>Assessment of visual effects: Size and scale: The proposed development will be seen as turbine hubs and blades over the forest on the far side of the River Findhorn Valley, at a distance of 2.5km. 15 out of 16 turbine blades will be apparent above the forested horizon. Lower parts of the turbines will be screened by coniferous forest on the other side of the valley, whilst this remains in place. The turbines will form a relatively well spaced grouping however with some overlapping of turbine blades. The turbines will introduce further man-made structures of a different nature and scale to the existing view which includes an overhead power line, and will introduce movement to the view. The scale of change is judged to be large for receptors at this viewpoint. The geographical extent is judged to be small as this view is only seen from the bell tower and its immediate surroundings, due to surrounding woodland and forestry in the Findhorn Valley.</p>			
<p>Effect and Significance: Overall, the magnitude of visual change during the operational phase will be high. The introduction of the proposed development will give rise to a major (significant) effect on receptors at this viewpoint.</p>			

Table 5.23: Viewpoint 9 - Knock of Braemoray

Viewpoint 9 - Knock of Braemoray			
Grid Reference (NGR)	301101, 841800	Figure Number	5.2.9
LCT	Open Rolling Upland (291) LCT	Designated Landscape or Wild Land Area	None
Direction of View	West	Distance to Nearest Turbine (km)	2.75
<p>Location, description of existing view and potential receptors: This viewpoint is located on the summit of the Knock of Braemoray to the east of the site. The Dava Way passes around the eastern side of the Knock of Braemoray. As such, this viewpoint represents the views for walkers who climb the hill as a detour. The view towards the site looks over a foreground of the lower undulating moorland slopes of the Knock of Braemoray, with the open, gently sloping moorland that makes up the flanks of Cairn Duhie beyond. 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. From this viewpoint, a full 360° panorama view is available, with a number of other operational wind farm developments visible including Tom nan Clach, Moy and Farr to the west. To the east and north-east Paul's Hill, Berry Burn, Rothes Phase I and II, Bognie Farm, Cluny Farm and Findhorn Wind Farms are visible around the panorama, with the Hill of Glaschlye Wind Farm approximately 6km away to the north-east.</p>			
<p>Sensitivity: This viewpoint is used to represent walkers climbing the hill. Recreational receptors are assumed to have medium-high susceptibility to changes in views at this hill summit. Since the Knock of Braemoray is a 'Landmark Hill' listed by Moray Council²², and provides extensive panoramic views across the landscape, the value of the viewpoint is considered to be high. Taking account of the judgements of susceptibility and value, overall sensitivity is judged to be high.</p>			
<p>Assessment of visual effects: Size and scale: The proposed development will be seen on the moorland over Cairn Duhie at a distance of 2.8km. 16 hubs and 16 turbine blades will be visible in this view, seen below the horizon with the exception of a 3 sets of blade tips. The proximity of the site means that the turbines will form a large scale change in the view to the west. There will also be some overlapping of turbine blades and some limited stacking of turbine towers in this view. The proposed substation will also be visible from this viewpoint. The substation will be visible to the right of the most northerly turbine, and it will be seen in the context of existing electricity infrastructure, due to the overhead power line. When new native tree planting around the substation matures, it will provide some screening/ filtering of views of the substation as well as a planted backdrop for it. Since this view has an elevated location, ground level infrastructure including turbine access tracks will be visible. From the hill summit, the proposed development will be seen in combined views with Tom nan Clach Wind Farm and further operational wind farms in distant views to the west. However, given the distance between the proposed development and Tom nan Clach it will be read as a distinct scheme in closer proximity views. Within the wider panoramic view, the proposed development will be seen in successive views with operational schemes to the east and north-east and bring wind farm development in closer proximity to the viewpoint.</p>			

²² Moray Council (2017) Supplementary Guidance: Moray Onshore Wind Energy.

Viewpoint 9 - Knock of Braemoray
The scale of change is judged to be large for receptors at these viewpoints. The geographical extent is judged to be small at this viewpoint as the view is limited to the summit of the Knock of Braemoray.
Effect and Significance: Overall, the magnitude of visual change during the operational phase will be high. The introduction of the proposed development will give rise to a major (significant) effect on receptors at this viewpoint.

Table 5.24: Viewpoint 10 - Cairn Glas Brae on the A939

Viewpoint 10 - Cairn Glas Brae on the A939			
Grid Reference (NGR)	295915, 846658	Figure Number	5.2.10
LCT	Narrow Wooded Valley - Moray & Nairn (286) LCT	Designated Landscape or Wild Land Area	None
Direction of View	South-east	Distance to Nearest Turbine (km)	3.18
<p>Location, description of existing view and potential receptors: This viewpoint is located on the A939 to the north-west of the site near Cairnglass. This viewpoint represents direct views experienced by road users, including tourists, travelling southwards along the A939, with views across the Findhorn Valley.</p> <p>The view towards the site looks across the Findhorn Valley with glimpses of flatter areas of pasture and the River Findhorn in the lower lying foreground. In the immediate foreground a wood pole telephone line is visible. The ground beyond rises and the valley sides are well forested and contribute to a forested horizon across middle distance parts of the view to the south-east. The open moorland of the site is largely screened by intervening forested landform. Some steel tower pylons are apparent beyond the middle-distance forested horizon. Moorland covered hills to the south-east of the site are apparent in the longer distance.</p> <p>To the east, the view comprises areas of broadleaved woodland in foreground, and pastoral grassland, back clothed by forested valley sides. To the west the view is contained by broadleaved woodland and steep forested slopes.</p> <p>No wind farm developments are visible from this viewpoint.</p>			
<p>Sensitivity: The viewpoint is located along the A939 which is a recognised tourist route however, the views tourists will obtain while travelling in vehicles will be transitory. Tourists at this viewpoint are therefore judged to have medium susceptibility to changes in views.</p> <p>Since the viewpoint is located on a key tourist route, it is considered to be of high value.</p> <p>Taking account of the judgements of susceptibility and value, overall sensitivity is judged to be medium-high.</p>			
<p>Assessment of visual effects: Size and scale: The proposed development will be apparent above the forested middle-distance horizon at a distance of 3.2km. The blades of 15 turbines will be apparent. The turbines will be seen as an irregularly shaped grouping with some overlapping of turbine blades. The composition of the turbines will change as road users move along the road. Whilst this is a direct view from a more open section of the road, views from the A939 to the north of the Findhorn Valley are quite fleeting and dependant on gaps in roadside forest cover.</p> <p>The scale of change is judged to be medium for receptors at this viewpoint. The geographical extent is judged to be small as this viewpoint is localised to a small stretch of the A939.</p>			
<p>Effect and Significance: Overall, the magnitude of visual change during the operational phase will be medium. The introduction of the proposed development will give rise to a moderate (significant) effect on receptors at this viewpoint. However, the level of visibility will change as road users move along the road and this represents a worst-case scenario and more open view.</p>			

Table 5.25: Viewpoint 11 - B9007, Old Military Road

Viewpoint 11 - B9007, Old Military Road			
Grid Reference (NGR)	294199, 838878	Figure Number	5.2.11
LCT	Open Rolling Upland (291) LCT	Designated Landscape or Wild Land Area	Within the Drynachan, Lochindorb and Dava Moors SLA
Direction of View	North-east	Distance to Nearest Turbine (km)	4.51
<p>Location, description of existing view and potential receptors: This viewpoint is at a 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 north-east. The viewpoint is used to represent views experienced by road users and walkers on the old military road, as well as views from the Drynachan, Lochindorb and Dava Moors SLA looking beyond the designated landscape. The B9007 is one of the few north to south routes over the hills along the northern edge of the Cairngorms National Park, running from Duthill near Carrbridge to Ferness. 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 it is not a notable landmark in the view. Beyond Cairn Duhie hubs and blade tips of Hill of Glaschyle Wind Farm can be seen, and to the west Tom nan Clach Wind Farm is visible on the horizon.</p>			
<p>Sensitivity: The viewpoint is used to represent views experienced by road users, including tourists, and walkers, who are judged to have medium susceptibility to changes in views. Although it is located on a B road remote from any properties, this viewpoint represents the views from the SLA, and is therefore considered to be of high value. Taking account of the judgements of susceptibility and value, overall sensitivity is judged to be medium-high.</p>			
<p>Assessment of visual effects: Size and scale: The proposed development will be seen across Cairn Duhie, as an array of turbines on the horizon at a distance of 4.5km. 16 hubs and 16 turbine blades will be visible above the horizon. The layout will form a coherent group of turbines with some overlapping of turbine blades and stacking of turbines. Given the distance to the site and large-scale nature of the view to the north and west, the turbines will be seen as notable features in middle distance views to the north-east. Tracks will be visible where the bases of the turbines are visible on the south-western flank of Cairn Duhie. The proposed development will be seen in front of the distant blade tips of the Hill of Glaschyle Wind Farm. The scale of change is judged to be medium for receptors at this viewpoint. The geographical extent is judged to be small as the views will be localised to a small stretch of the B9007.</p>			
<p>Effect and Significance: Overall, the magnitude of visual change during the operational phase will be medium. The introduction of the proposed development will give rise to a moderate (significant) effect on receptors at this viewpoint.</p>			

Table 5.26: Viewpoint 12 - Drumguish Croft

Viewpoint 12 - Drumguish Croft			
Grid Reference (NGR)	300590, 837550	Figure Number	5.2.12
LCT	Open Rolling Upland (291) LCT	Designated Landscape or Wild Land Area	Within the Drynachan, Lochindorb and Dava Moors SLA
Direction of View	North-west	Distance to Nearest Turbine (km)	4.85
<p>Location, description of existing view and potential receptors: This viewpoint is located on the A939 to the south-east of the site, near a property called Drumguish Croft. The viewpoint is representative of views experienced by road users of the A939 travelling northwards towards Dava along a key route from the CNP, as well as similar views experienced by residential receptors at Drumguish Croft. The view towards the site is across a foreground of rough moorland with a band of coniferous forest between the viewpoint and Cairn Duhie beyond. To the left (south-west) of Cairn Duhie, the Hill of Aitnoch is visible as well as distant hills contributing to the distant horizon. A wood pole telegraph line is visible in the immediate foreground of the view. To the north-east the Knock of Braemoray is visible, and to the east moorland sloping from the roadside contributes to the more immediate moorland horizon. To the south, hills along the northern edge of the CNP are visible, and to the west views are contained by the moorland slopes of Carn Ruigh Chorrach, interspersed with small patches of pasture and rough grassland. A small number of turbine hubs and blades within the Tom nan Clach Wind Farm are visible to the west above the horizon.</p>			
<p>Sensitivity: The viewpoint is on a recognised tourist route close to the boundary of the CNP and represents tourists as well as residential receptors at Drumguish Croft. Receptors at this viewpoint are therefore considered to have high susceptibility to changes in views. Since the viewpoint is located on a recognised tourist route and is located within the SLA, it is considered to be of high value. Taking account of the judgements of susceptibility and value, overall sensitivity is judged to be high.</p>			
<p>Assessment of visual effects: Size and scale: The proposed development will be seen on the moorland of Cairn Duhie, at a distance of 4.9km. 16 hubs and 16 turbine blades will be visible above the horizon. The turbines will be seen as a relatively compact group from this viewpoint, occupying a relatively small extent of the horizon in these large scale and expansive views. There will be some overlapping of turbine blades and some limited overlapping of turbine towers. However, the composition of the layout will change as road users move along the A939. Access tracks between turbines will also be visible from this location. The proposed development will be seen in successive views with Tom nan Clach to the west. The scale of change is therefore judged to be medium for receptors at this viewpoint. The geographical extent is judged to be medium as views are available for a relatively long stretch of the A939.</p>			
<p>Effect and Significance: Overall, the magnitude of visual change during the operational phase will be medium. The introduction of the proposed development will give rise to a major (significant) effect on receptors at this viewpoint.</p>			

Table 5.27: Viewpoint 13 - A940, Aucheorn

Viewpoint 13 - A940, Aucheorn			
Grid Reference (NGR)	302037, 847230	Figure Number	5.2.13
LCT	Narrow Wooded Valley - Moray & Nairn (286) LCT	Designated Landscape or Wild Land Area	Within the Findhorn Valley and the Wooded Estates SLA
Direction of View	South-west	Distance to Nearest Turbine (km)	5.22
<p>Location, description of existing view and potential receptors: This viewpoint is located on the A940 near the cluster of properties at Aucheorn. It is representative of views from the Dava Way which passes along the disused railway to the east of the viewpoint and from local properties with more open views. Similar glimpsed views will be experienced by road users on the A940 to the north-east of the site.</p> <p>The view towards the site looks over a pastoral field adjacent to the road in the foreground, and over the treetops of middle-distance woodlands. Mixed woodland constitutes most of the horizon in this view however, there are glimpsed views of the distant hills to the south-east beyond Cairn Duhie between and above the woodland. To the south, the Knock of Braemoray is also visible above the middle-distance horizon. To the west, the view extends over the field adjacent to the road, with a wood post telephone line traversing the field. Views to the north and east are contained by topography and woodland around the viewpoint.</p> <p>No wind farm developments are visible from this location.</p>			
<p>Sensitivity: 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.</p> <p>The A940 is a popular route with tourists and the Dava Way is a popular long distance walking route. The viewpoint is therefore considered to be of high value.</p> <p>Taking account of the judgements of susceptibility and value, overall sensitivity is judged to be high.</p>			
<p>Assessment of visual effects: Size and scale: The proposed development will be visible at a distance of 5.2km, with 13 turbines visible as they emerge above the middle ground woodland in views to the south-west. The proposed development will be partially screened by the middle ground woodland, and will appear as a relatively regularly spaced group of turbines if it were fully visible, with only a few instances of turbine stacking and overlapping blades. Woodland screening plays a notable role in screening the proposed development, whilst it remains in place. The level of visibility will also change as road users move along this route and this view represents a worst-case scenario and more open sequential view.</p> <p>The scale of change is judged to be medium for receptors at this viewpoint. The geographical extent is judged to be small as views from the A940 are glimpsed through woodland.</p>			
<p>Effect and Significance: Overall, the magnitude of visual change during the operational phase will be medium. The introduction of the proposed development will give rise to a moderate (significant) effect on receptors at this viewpoint.</p>			

Table 5.28: Viewpoint 14 - A939 and Dava Way

Viewpoint 14 - A939 and Dava Way			
Grid Reference (NGR)	301422, 834555	Figure Number	5.2.14
LCT	Open Rolling Upland (291) LCT	Designated Landscape or Wild Land Area	At the edge of the Drynachan, Lochindorb and Dava Moors SLA
Direction of View	North-west	Distance to Nearest Turbine (km)	7.9
<p>Location, description of existing view and potential receptors: 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 2.3km from where the A939 leaves the CNP, although the park boundary lies approximately 600m 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 CNP. This section of the A939 is one of the few routes that run north-south over the hills along the northern edge of the CNP, running from Grantown-on-Spey to Dava (where it meets the A940).</p> <p>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-west, 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 forestry alongside the disused 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.</p> <p>No wind farm developments are visible from this location.</p>			
<p>Sensitivity: The viewpoint is on a long-distance walking path, the Dava Way, and adjacent to a main tourist route on the edge on the CNP with large numbers of tourist viewers. Tourists and recreational walkers are assumed to have high susceptibility to changes in views.</p> <p>The viewpoint is located on the Dava Way, adjacent to the Highland Tourist Route, and sits at the edge of the Drynachan, Lochindorb and Dava Moors SLA. It is also close to the CNP boundary. The viewpoint is there considered to be of high value.</p>			
<p>Assessment of visual effects: Size and scale: The proposed development will be seen at a distance of 7.9km, on a lower lying section of the horizon to the north-west between the Knock of Braemoray and Hill of Aitnoch. 16 hubs and 16 turbine blades will be visible across the middle-distance horizon, as a compact group with overlapping turbine blades and some turbine stacking. The composition of the layout will change as recreational users move along the Dava Way.</p> <p>Sections of access tracks between turbines will be visible through harder to discern at this distance. The proposed development will be seen ahead of the view travelling north. It will introduce vertical elements and movement into this large scale and expansive view.</p> <p>The scale of change is judged to be medium for receptors at this viewpoint. The geographical extent is judged to be medium, as this viewpoint represents views from a section of the Dava Way, the A939 and hills either side of the Anaboard Burn valley to the edge of the CNP.</p>			
<p>Effect and Significance: Overall, the magnitude of visual change during the operational phase will be medium. The introduction of the proposed development will give rise to a moderate (significant) effect on receptors at this viewpoint.</p>			

Table 5.29: Viewpoint 15 - Carn nan Gabhar above Lochindorb

Viewpoint 15 - Carn nan Gabhar above Lochindorb			
Grid Reference (NGR)	298030, 833770	Figure Number	5.2.15
LCT	Open Rolling Upland (291) LCT	Designated Landscape or Wild Land Area	Within the Drynachan, Lochindorb and Dava Moors SLA
Direction of View	North	Distance to Nearest Turbine (km)	8.03
<p>Location, description of existing view and potential receptors: This viewpoint is located on the track that passes over Carn nan Gabhar, above and to the south-east of Lochindorb. It represents views experienced by walkers using this path, and is also used to represent potential views of the proposed development overlooking the castle and Lochindorb (see Chapter 6: Cultural Heritage for details of effects on Lochindorb). Views from the Carn nan Gabhar ridge are panoramic, looking over Lochindorb and the extensive open moorlands to the west of the B9007, visible as a ribbon of road through the moorland. 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. To the south-west, the upland plateau at the edge of the CNP is visible. From this location Tom nan Clach Wind Farm is visible to the west.</p>			
<p>Sensitivity: Walkers on this path are few, but there are those who climb up to gain views over Lochindorb. Since receptors at this viewpoint are likely to engage with the surrounding view, they are assumed to have high susceptibility to changes in views. This viewpoint lies within the Drynachan, Lochindorb and Dava Moors SLA, and there are scenic qualities to the view over Lochindorb. The viewpoint is therefore considered to be of high value. Taking account of the judgements of susceptibility and value, overall sensitivity is judged to be high.</p>			
<p>Assessment of visual effects: Size and scale: The proposed development will be visible on the middle-distance moorland, beyond the of Hill of Aitnoch to the right, at a distance of 8.0km. It will be seen beyond Lochindorb, but not above the Castle, which is set further to the left (west) in the view. The hubs and turbine blades of 15 turbines will be apparent across the horizon, and will appear as a compact group in the view. However, some turbines will appear clustered together with notable turbine stacking and overlapping blades visible from the angle of view. Sections of access tracks will also be visible between the turbines, though harder to discern at this viewing distance. The proposed development will form a notable feature in the view, seen in successive views with Tom nan Clach Wind Farm to the west. The scale of change is judged to be medium for receptors at this viewpoint. The geographical extent is judged to be small as this view will be localised to this section of the track across Carn nan Gabhar.</p>			
<p>Effect and Significance: Overall, the magnitude of visual change during the operational phase will be medium. The introduction of the proposed development will give rise to a moderate (significant) effect on receptors at this viewpoint.</p>			

Table 5.30: Viewpoint 16 - Carn Kitty

Viewpoint 16 - Carn Kitty			
Grid Reference (NGR)	308965, 842760	Figure Number	5.2.16
LCT	Open Rolling Upland (291) LCT	Designated Landscape or Wild Land Area	Near the edge of the Drynachan, Lochindorb and Dava Moors SLA
Direction of View	West	Distance to Nearest Turbine (km)	10.48
<p>Location, description of existing view and potential receptors: This viewpoint is located at the summit of Carn Kitty, located close to the Moray/Scottish Highlands boundary. It is approximately 6.8 km from the CNP boundary. The viewpoint is representative of views obtained by hill climbers at the summit of the hill. The view towards the site is between the turbines of Berry Burn Wind Farm, out across moorland along 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. Tom nan Clach Wind Farm is visible in views further west, beyond Cairn Duhie to the left in the view. Beyond the Berry Burn Wind Farm, Paul's Hill Wind Farm is visible, to the north east Rothes Phase I and Phase II Wind Farms are visible, and to the north-west the Hill of Glaschyle Wind Farm is visible. Hill of Towie and Dorenell Wind Farms are visible in distant views to the east and south-east.</p>			
<p>Sensitivity: Given the proximity of wind turbines to this summit viewpoint, viewers will experience close-proximity views of turbines. Recreational receptors in this context are considered to be of medium-low susceptibility. Carn Kitty is a 'Landmark Hill' listed by the Moray Council²³, and lies approximately 800m from the council boundary that also forms the boundary of the Drynachan, Lochindorb and Dava Moors SLA. The viewpoint is therefore considered to be of high value. Taking account of the judgements of susceptibility and value, overall sensitivity is judged to be medium.</p>			
<p>Assessment of visual effects: Size and scale: The proposed development will be seen in at a distance of 10.5km, to the west and just beyond the Knock of Braemoray. This landform will screen the some of the southernmost turbines such that only tips are visible. The remainder of turbines in proposed development will be fully visible. From this viewpoint, turbines will appear as an irregularly spaced group, with some overlapping of blades. The proposed development will be contained below the distant horizon. The proposed development will be further from the viewpoint than Berry Burn or Paul's Hill turbines, but at a similar distance away as to Rothes Phase I and Phase II Wind Farms (approximately 10km away) seen in successive views to the east. Overall, the scale of change is judged to be small, given the presence of turbines close to the viewpoint and the introduction of the additional group of turbines in the distance. The geographical extent is judged to be small as views are localised to the summit of Carn Kitty.</p>			
<p>Effect and Significance: Overall, the magnitude of visual change during the operational phase will be low. The introduction of the proposed development will give rise to a minor (not significant) effect on receptors at this viewpoint.</p>			

²³ Moray Council (2017) Supplementary Guidance: Moray Onshore Wind Energy.

Table 5.31: Viewpoint 17 - Carn Allt Laoigh

Viewpoint 17 - Carn Allt Laoigh			
Grid Reference (NGR)	292262, 831278	Figure Number	5.2.17
LCT	Open Rolling Upland (291) LCT	Designated Landscape or Wild Land Area	Within the Drynachan, Lochindorb and Dava Moors SLA, and at the edge of the CNP
Direction of View	North-east	Distance to Nearest Turbine (km)	11.83
<p>Location, description of existing view and potential receptors: 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 CNP. The CNP boundary crosses over this hill. The viewpoint is representative of views from the CNP 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.</p> <p>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 CNP), 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. To the north-east, 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.</p> <p>To the west in the view, Tom nan Clach is visible and is the closest wind farm to the viewpoint, approximately 6km to the north-west, with Moy and Farr Wind Farms also visible in views west and north-west. In the direction of the site, the Hill of Glaschlye Wind Farm is visible to the right (east) of Cairn Duhie, and Berry Burn Wind Farm is visible to the right (east) of the Knock of Braemoray, with Rothes Phase I and Phase II Wind Farms visible beyond. Paul's Hill Wind Farm is also visible on the horizon further to the right.</p>			
<p>Sensitivity: There are relatively few visitors to this location and there are no worn paths, although there is evidence of vehicle wheels near the viewpoint. However, recreational walking receptors are judged to have medium-high susceptibility to changes in views.</p> <p>There are scenic qualities to the view, valued through the SLA and CNP designation of the landscapes around the viewpoint, and value is therefore judged to be high.</p> <p>Taking account of the judgements of susceptibility and value, overall sensitivity is judged to be high.</p>			
<p>Assessment of visual effects: Size and scale: The proposed development will be visible on the middle distant moorland, on the low profile of Cairn Duhie, partially beyond the low profile of Hill of Aitnoch at a distance of 11.8km. The turbines to the right (east) of the group will be partially screened by the Hill of Aitnoch so that only their hubs and blades will be visible, resulting in at least 15 sets of turbine blades still being visible. There will also be some turbine stacking visible from this viewpoint. The upper tips of the turbines will extend above the horizon and will be seen with the backdrop of the lowlands and the sea beyond.</p> <p>The proposed development will form a feature in that part of the view where the landscape makes the transition from moorland to forested lowlands. The proposed development will be seen in combined views with other closer proximity and longer distance operational wind farms.</p>			

The scale of change is judged to be **small** for receptors at this viewpoint. The geographical extent is judged to be **medium** as similar views can be seen from other summits and north facing slopes around Carn Allt Laoigh.

Effect and Significance:

Overall, the magnitude of visual change during the operational phase will be medium. The introduction of the proposed development will give rise to a **moderate (significant)** effect on receptors at this viewpoint.

Table 5.32: Viewpoint 18 - Carn a’Ghille Chearr

Viewpoint 18 - Carn a’Ghille Chearr			
Grid Reference (NGR)	313962, 829849	Figure Number	5.2.18
LCT	Smooth Rounded Hills - Cairngorms (123) LCT	Designated Landscape or Wild Land Area	At the edge of the CNP
Direction of View	North-west	Distance to Nearest Turbine (km)	19.74
<p>Location, description of existing view and potential receptors: This viewpoint is located at the summit of Carn a’Ghille Chearr, located on north-eastern end of the Hills of Cromdale ridge. The Hills of Cromdale lie at the northern boundary to the CNP, and divide Strath Avon from Strathspey. This viewpoint is used to represent higher elevation views from the south-eastern part of the study area. The view from the top is a 360° panorama with the Cairngorm Mountains to the south, Easter Ross and Ben Wyvis to the north-west, and the coastal landscapes of the Moray Firth to the north. The focus of the panorama includes the mountains visible and the Moray Firth. The view towards the site includes the summit area of Carn a’Ghille Chearr in the foreground, but the downward slopes from the summit are hidden by the convex topography of the hill. In the distance the view is over Strathspey, with Grantown On Spey 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.</p> <p>Paul’s Hill Wind Farm is the closest visible wind farm to the viewpoint, located approximately 10km away to the north. Additionally, within views towards the site, Hill of Glaschyle is visible to the right (east) of Cairn Duhie and Berry Burn, Rothes Phase I and Phase II Wind Farms are visible to the north, as discrete groups of turbines on rounded hills. Hill of Towie Wind Farm is also visible to the east and Dorenell Wind Farm is visible to the south-east. To the north-west Tom nan Clach Wind Farm is also visible.</p>			
<p>Sensitivity: This hilltop is visited by walkers, who are judged to have high susceptibility to changes in views. This hilltop has scenic qualities that include both the mountains of the Cairngorms and the Moray Firth. The viewpoint represents views from the CNP, and value is therefore judged to be high. Taking account of the judgements of susceptibility and value, overall sensitivity is judged to be high.</p>			
<p>Assessment of visual effects: Size and scale: The proposed development will be seen at a distance of 19.7km, as a group of turbines separate from the Hill of Glaschyle, Berry Burn, Paul’s Hill, Rothes Phase I and Phase II Wind Farms, on lower moorland to the north-west of the viewpoint, beyond the settled valley of the River Spey. It will be further from the viewpoint than Paul’s Hill Wind Farm, and will not break the horizon from this elevated vantage point. The scale of the change is judged to be small for receptors at this viewpoint. The geographical extent is judged to be small as it is limited to views along the Hills of Cromdale ridge.</p>			
<p>Effect and Significance: Overall, the magnitude of visual change during the operational phase will be low. The introduction of the proposed development will give rise to a minor (not significant) effect on receptors at this viewpoint.</p>			

Effects on Views from Settlements

5.89 Theoretical visibility of the wind farm from settlements across the study area is illustrated by Figures 5.1.2a and 5.1.3a. Visual effects from settlements, which have been taken forward for detailed assessment, as outlined in Table 5.6, are discussed below. Where a settlement is represented by an assessment viewpoint reference is made to this.

Table 5.33: Ferness

Ferness			
Representative viewpoints:	VP4: Ferness	Approximate distance from settlement to nearest turbine (closest point):	1.5km
<p>Location, description of existing view and potential receptors: Ferness is located centrally within the study area, less than a kilometre to the north-west of the site. The settlement comprises a row of cottages located along the B9007, adjacent to the junction where the B-road meets the A939, as well as a property and hall on the north side of the road junction. Views towards the site look across a rough grazing field to the A939 and a coniferous forest plantation (New Inn Wood) owned by Forestry and Land Scotland (FLS), immediately beyond the A-road, which screens direct views of the site. To the south, a line of coniferous trees along a field boundary also filters the view.</p>			
<p>Sensitivity: Residents are assumed to have high susceptibility to changes in views from their properties. Residents are assumed to value the views from Ferness, and the settlement is adjacent to a recognised tourist route (the A939). Views from Ferness are therefore considered to be of high value. Taking account of the judgements of susceptibility and value, overall sensitivity is judged to be high.</p>			
<p>Assessment of visual effects: Size and scale: From the line of cottages to the west of the junction there will be no visibility of turbines due to the coniferous forest that screens the site. Due to the nature of the management regimes adopted for the area (with forestry to the east of Ferness assigned as low impact silviculture), it is unlikely that screening will be lost from these views in the future. The scale of change is judged to be small for the settlement as a whole. The geographical extent is judged to be small as any limited visibility of upper turbine blades of the proposed development will be localised to the line of cottages along the B9007. The property and hall to the north of the road junction face away from the site and have very limited theoretical visibility because of landform.</p>			
<p>Effect and Significance: Overall, the magnitude of visual change during the operational phase will be low. The introduction of the proposed development will therefore give rise to a Negligible (Not Significant) effect on this settlement.</p>			

Table 5.34: Dava

Dava			
Representative viewpoints:	VP12: Drumguish Croft	Approximate distance from settlement to nearest turbine (closest point):	3.7km
Location, description of existing view and potential receptors: Dava is located within the centre of the study area, approximately 2.5km away from the site to the south-east and on the north-eastern edge of the Drynachan, Lochindorb and Dava Moors SLA. The settlement comprises 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. Woodland and forest around Dava largely screen most outward looking views from the properties adjacent to the Dava Way. Viewpoint 12 represents worst case scenario views experienced on the approach to Dava from the south, by residents of Dava who use the A939 to access their properties.			
Sensitivity: Residents are assumed to have high susceptibility to changes in views from their properties. Residents are assumed to value the views from the settlement. Dava is located within an SLA, and the A939 which passes through the settlement is a recognised tourist route. The Dava Way long-distance walking route also passes the settlement. Views from Dava are therefore considered to be of high value. Taking account of the judgements of susceptibility and value, overall sensitivity is judged to be high .			
Assessment of visual effects: Size and scale: From the properties in Dava along the A939 and A940 with more open views to the north-west there will be views of the proposed development, seen along the forested horizon to the north and north-west, between the Hill of Aitnoch to the west, and the Knock of Braemoray to the east. The turbines will be approximately 3.7km away, visible as blades and tips as they extend above the trees and woodland across the moorland. The turbines will form prominent features in the views which currently extend over open moorland and forest with few vertical elements. Where open views towards the proposed development are available the scale of change is judged to be high . A number of properties, including along the Dava Way, will have limited visibility due to intervening forest cover. The geographical extent is judged to be small as views are localised to the settlement edges.			
Effect and Significance: The introduction of the proposed development will therefore give rise to a major (significant) effect for a limited number of properties in this settlement cluster (properties located along the A939 and A940 with more open views to the north-west). For properties located along the Dava Way, foreground forest cover will screen views.			

Effects on Views from Routes

- 5.90 Visibility from a route is not uniform along its entire length. This is because views of the surrounding landscape change due to the landform, built form, and vegetation cover as the viewer moves along the route. Sequential effects from the key routes which have been taken forward for detailed assessment, as outlined from Table 5.7, are set out below.

Table 5.35: A939 Nairn to Tomintoul

A939 Nairn to Tomintoul			
Representative viewpoints:	VP1: A939 South of Ferness Village, VP2: Little Aitnoch VP4: Ferness VP6: A939, west of Aitnoch VP10: Cairn Glas Brae on the A939 VP12: Drumguish Croft VP14: A939 and Dava Way	Approximate distance from route to nearest turbine (closest point):	0.2km
Location, description of existing view and potential receptors: The A939 passes across the centre of the study area, running between Nairn to the north and Tomintoul and beyond to the south-east. The road passes through the lower lying farmland to the north before passing through the open moorland that characterises the upland landscape within the centre of the study area. Between Ferness and Aitnoch, the road runs immediately parallel to the western boundary of the site. As the road enters the CNP to the south, it travels through undulating farmland and woodland before passing the south-western flanks of the Hills of Cromdale. Receptors include road users travelling in both directions on this route. Short to longer distance views of the site are possible when travelling both north and southwards. When travelling southwards towards the site, roadside vegetation, including woodland and coniferous forest, screen the majority of views towards the site and limits the opportunity for shorter distant views. Travelling northwards towards the site, longer distance views are available from north of Glaschoil until Dava, where views become available at a much closer range. Berry Burn and Hill of Glaschyle Wind Farms are visible from some sections of this route around Aitnoch and north of the Findhorn Valley, and other wind farms are also visible from stretches of the route. This includes Tom nan Clach which is visible from sections to the south of Dava, and Paul's Hill, which is visible in the vicinity of Aitnoch and to the south of Grantown-on-Spey.			
Sensitivity: Although road users on this route are fast moving, the highest susceptibility group of road users on this route are tourists, who are assumed to have medium-high susceptibility to changes in views from routes. The road is considered to be a key tourist route, used by tourists to travel to and from the CNP, passing through the Drynachan, Lochindorb and Dava Moors SLA to the south of the site. The value of views from this road are therefore judged to be high . Taking account of the judgements of susceptibility and value, overall sensitivity is judged to be high .			
Assessment of visual effects: Size and scale: When travelling north, visibility from within the CNP will be limited and views will be long distance and fleeting. From outside the CNP south of Dava, the proposed development will be visible in direct middle distance views seen on the low hill of Cairn Duhie to the west of the Knock of Braemoray across open ground. Between Dava and Ferness, the turbines will be seen close to the route in oblique views with some limited screening or filtering by trees and woodland along the route. Given that the route passes to the immediate west of the site, significant sequential effects will be experienced at close distances, but will be relatively short lived for most receptors, given this is a fast road. When travelling south, north of the Findhorn valley, the landscape through which the route passes is more wooded, with large areas of coniferous plantation. There will be more limited views of the proposed development, which will be seen as turbine blades above forest, from along these sections. On balance the scale of change is judged to be large . The geographical extent is judged to be large as views of the proposed development are available from numerous sections of the route.			

A939 Nairn to Tomintoul
<p>Effect and Significance:</p> <p>Overall, the magnitude of visual change during the operational phase will be high. The introduction of the proposed development will therefore give rise to a major (significant) effect on receptors travelling along this route. In summary, these will be focused on the section of route which passes to the immediate west of the site (some distance from the CNP) and to the north of the CNP boundary, experienced when travelling north after departure from the CNP. Effects from within the CNP itself will be limited to higher ground, avoiding effects on key routes.</p>

Table 5.36: A940 Forres to Dava

A940 Forres to Dava			
Representative viewpoints:	VP5: A940, above Kerrow VP13: A940, Auchearn	Approximate distance from route to nearest turbine (closest point):	1.4km
<p>Location, description of existing view and potential receptors:</p> <p>The A940 passes through the centre of study area to the east of the site, and runs between Forres to the north-east and Dava to the south-east. From Forres, the road passes through lowland farmland and forestry, running along the eastern fringe of the Findhorn Valley through Logie and Edinkillie, before travelling southwards through the upland moorland landscape in which the site lies, passing the Knock of Braemoray immediately to the east of the site.</p> <p>Receptors include road users travelling in both directions on this route. Between Dava and Beachans open and short distance views of the site are possible, particularly where the road passes the Knock of Braemoray. Roadside vegetation and coniferous forestry does, however, intermittently interrupt views west towards the site along this stretch of the road. North of Logie, views of the site are limited.</p> <p>Hill of Glaschyle and Berry Burn Wind Farms are visible from some sections of the route, around Beachans and Logie, 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.</p>			
<p>Sensitivity:</p> <p>Road users on this route include local residents and tourists who are considered to have medium-high susceptibility to changes in views. The road passes through the Findhorn Valley and the Wooded Estates SLA and is a popular route amongst tourists. The views from the route are therefore judged to be of high value.</p> <p>Taking account of the judgements of susceptibility and value, overall sensitivity is judged to be high.</p>			
<p>Assessment of visual effects:</p> <p>Size and scale: There is theoretical visibility of the proposed development between Dava and Logie, and limited visibility south of Forres. The route is approximately 1.4km 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 will be sections of this route with open views of the proposed development, particularly at the southern end of the route, along the stretch that passes east of the site near the Knock of Braemoray. The turbines will be visible in oblique views, with sections of tracks and transformers visible where the bases of the turbines are visible.</p> <p>The scale of change is judged to be medium for the route as a whole. The geographical extent is judged to be small as views of the proposed development will be localised due to woodland and forestry screening turbines from most of the stretches of route that have theoretical visibility.</p>			
<p>Effect and Significance:</p> <p>Overall, the magnitude of visual change during the operational phase will be medium. The introduction of the proposed development will therefore give rise to a moderate (significant) effect on receptors travelling on this route. This will be focused to the section of route as it passes to the east of the site.</p>			

Table 5.37: B9007 Logie to Duthil

B9007 Logie to Duthil			
Representative viewpoints:	VP4: Ferness VP7: B9007, near Mount VP11: B9007, Old Military Road	Approximate distance from route to nearest turbine (closest point):	1.6km
Location, description of existing view and potential receptors: The B9007 passes through the centre of the study area to the west of the site, and runs between Logie to the north-east and Duthil to the south-west of the site, via Ferness. The section of the route between Logie and Ferness is through a generally wooded landscape, and it runs through more open moorland south of Dunearn. Receptors include road users travelling in both directions on this route. Due to woodland and forestry that lines the route north of Dunearn, there is limited opportunity for short distance views of the site. Tom nan Clach Wind Farm is visible in middle to longer distance views west from a short stretch of the route adjacent to Lochindorb. Hill of Glaschyle and Berry Burn Wind Farms are visible in medium to longer distance views to the west from some short sections in proximity to Ferness and near Dunearn at the junction with the minor road to Lochindorb.			
Sensitivity: Road users on this route include tourists leaving the CNP, but the road is not as heavily used as the A939. Susceptibility of receptors is therefore judged to be medium . The route passes through the Drynachan, Lochindorb and Dava Moors SLA and the CNP, and is therefore considered to be of high value. Taking account of the judgements of susceptibility and value, overall sensitivity is judged to be high .			
Assessment of visual effects: Size and scale: Although some sections of this route are contained within woodland, or have woodland screening or filtering views, there will be sections of this route with views of the proposed 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 7 near Mount, (Figure 5.2.7), the turbines will be seen beyond coniferous forest. There will be theoretical visibility also at Ferness, approximately 1.6km from the site, but for most of this section views will largely be screened by intervening forestry and woodland. Open views towards the site can be seen from a short section between Burnside, represented by Viewpoint 11 (Figure 5.2.11), before the road passes round to the west of the Hill of Aitnoch. From this section there will be slightly oblique views of the proposed development on the middle distant land to the east of the road. Visibility of the proposed development will be very limited from the B9007 south of the location of Viewpoint 11. The scale of change is judged to be small for the route as a whole. The geographical extent is judged to be small as woodland and forestry screen the proposed development from most of the stretches of route that have theoretical visibility.			
Effect and Significance: Overall, the magnitude of visual change during the operational phase will be low. The introduction of the proposed development will therefore give rise to a minor (not significant) effect on receptors travelling on this route.			

Table 5.38: Dava Way (Core Path and promoted long-distance route)

Dava Way (Core Path and promoted long-distance route)			
Representative viewpoints:	VP9: Knock of Braemoray VP14: A939 and Dava Way	Approximate distance from route to nearest turbine (closest point):	3.1km
Location, description of existing view and potential receptors: The Dava Way runs north to south through the centre of the study area to the east of the site, between Forres and Grantown-on-Spey, broadly parallel to the A940 and A939 following the old Highland Railway Line. From Forres the route travels through lowland farmland and forest before passing through upland moorland and round the eastern side of the Knock Braemoray. As the route approaches Grantown-on-Spey, it travels through undulating farmland and woodland. Receptors on this route include recreational walkers travelling both north and southwards. Woodland, forestry and topography within 5km of the site limit opportunities for short distance views of the site. However, between Dava and Glaschoil there are medium to longer distance open views of the site. Those who take a detour to the summit of the Knock of Braemoray (represented by Viewpoint 9, Figure 5.2.9) will have elevated and open views of the site to the west. Hill of Glaschyle and Berry Burn Wind Farms are visible between Beachans and Knock of Braemoray. Rothes Phase I and Rothes Phase II are visible for a short section to the south of Forres in longer distance views to the east.			
Sensitivity: Recreational walkers on the Dava Way are focused on views of their surroundings and are therefore considered to have medium-high susceptibility to changes in views. The route lies within the Drynachan, Lochindorb and Dava Moors SLA and the CNP, and is a promoted long-distance walking route. The route is therefore considered to be of high value. Taking account of the judgements of susceptibility and value, overall sensitivity is judged to be high .			
Assessment of visual effects: Size and scale: There is theoretical visibility between Altyre Woods and Beachans, and between Dava and Glaschoil. The route is approximately 3km from the site at its closest point at Dava Junction. Although some sections of this route are contained within woodland, or have intervening woodland which filters or screens views, there will be sections of this route with views of the proposed development, particularly between Dava and Glaschoil which are more open. From these parts of the route with more open views, the proposed development will be seen as a prominent feature of the moorland to the north-west of the route, seen in sequential views with operational wind farms to the east of the route, where visible. The scale of change is judged to be medium for the route as a whole. The geographical extent is judged to be large as prolonged views of the proposed development will be seen between Glaschoil and Dava when walking northwards, although views from other sections of the route are more restricted due to woodland and screening through landform, including the Knock of Braemoray.			
Effect and Significance: Overall, the magnitude of visual change during the operational phase will be medium. The introduction of the proposed development will therefore give rise to a moderate (significant) effect on receptors travelling on this route between Glaschoil and Dava.			

Table 5.39: NCN 1

NCN 1			
Representative viewpoints:	N/A	Approximate distance from route to nearest turbine (closest point):	10.6km
<p>Location, description of existing view and potential receptors:</p> <p>National Cycle Route 1 runs between Ballintore north of Nigg in the north-west 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 north of the study area. The majority of the cycle route travels through forested farmland through the Black Isle and coastal farmland as is travels from Inverness to Elgin.</p> <p>Receptors on this route include cyclists travelling southwards, eastwards and westwards. At its closest point, the cycle route lies approximately 10.6km of the site, therefore any available views of the site are longer distance.</p> <p>Operational wind farms including Hill of Glaschyle and Berry Burn Wind Farms are visible from stretches along the Moray Coast between Nairn and Elgin, in longer distance views to the south.</p>			
<p>Sensitivity:</p> <p>Cyclists on NCN1 are largely recreational users, whose attention is often on views of their surroundings and are therefore considered to have medium-high susceptibility to changes in views. The route is a national cycle route and travels through the Culbin to Burghead Coast SLA. It also travels adjacent to the edge of a number of other SLAs along the route. The route is therefore considered to be of high value.</p> <p>Taking account of the judgements of susceptibility and value, overall sensitivity is judged to be high.</p>			
<p>Assessment of visual effects:</p> <p>Size and scale: There will 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 development is Urchany, approximately 10.6km away. Given the frequent settlements and woodland areas along this route, and the distance to the proposed development, actual visibility will be limited. When visible the proposed development will typically be seen in longer distance oblique views to the south, and in the context of a distant horizon which has been altered by operational wind farms.</p> <p>The scale of change is judged to be small for the route as a whole. The geographical extent is judged to be small as views of the proposed development will be localised to small sections of the route.</p>			
<p>Effect and Significance:</p> <p>Overall, the magnitude of visual change during the operational phase will be low. The introduction of the proposed development will therefore give rise to a minor (not significant) effect on receptors travelling on this route.</p>			

Potential Implications for Designated Landscapes

5.91 This section describes the implications of the proposed development for designated landscapes and Wild Land Areas in the study area, which have been taken forward for detailed assessment, as outlined in Table 5.4. Implications for the CNP have been assessed in the Cairngorms National Park Special Landscape Qualities Assessment in Appendix 5.2.

Table 5.40: Drynachan, Lochindorb and Dava Moors SLA

Drynachan, Lochindorb and Dava Moors SLA	
Receptor	Drynachan, Lochindorb and Dava Moors SLA
Description and Sensitivity	<p>Drynachan, Lochindorb and Dava Moors SLA lies within 5km to the south of the site. The Special Qualities of the SLA are as follows:</p> <ul style="list-style-type: none"> • <i>“A Sense of Solitude, Views over Heather Moorland, and Big Skies</i> • <i>Expansive views and broad panoramas across open, rolling moorland and vast skies instil a boundless sense of scale and space, enhanced by the consistency of moorland cover and landform character;</i> • <i>A narrow, deep section of the Findhorn river valley at Streens offers enclosed and intimate relief in contrast to the elevated and exposed moorland. Elsewhere, valleys frame views to Lochindorb;</i> • <i>Land management practices create distinctive abstract muirburn patterns, accentuated by ever-changing weather and light patterns;</i> • <i>The limited extent of tree cover and human habitation creates a simple yet powerful moorland image of tranquillity, simplicity and isolation which is emphasized by Lochindorb and its ruined castle;</i> • <i>Where buildings exist, these are of a distinctive estate character. Also building remains from pre clearance farmsteads, with enclosures, head dykes and associated field systems and improved land form one of the few built and ‘managed’ elements within the landscape. These engender a strong atmosphere which can arouse contemplative emotions of past human endeavour and hardship; and</i> • <i>The long, fairly straight routes through this landscape allow an easy appreciation of the openness and simplicity of the landscape. These are typically lined with permanent snow poles which serve to reinforce the impression that this is a landscape exposed to adverse weather.”²⁴</i> <p>Views from within the SLA are generally open and expansive with broad panoramas and long-distance views across the surrounding landscape. The open and expansive nature of views allow visibility of mountain ranges to the north, west and south. Both Tom nan Clach and Moy wind farms are located within the western extent of the SLA, and Tom nan Clach, in particular, is visible from a considerable area within the SLA, seen along the skyline in many west facing views. Turbines within Hill of Glaschyle, Berry Burn, Rothes (Phase I and Phase II), Paul’s Hill and Farr Wind Farms are also visible from parts of the SLA in views to the north-east.</p>
Changes	<p>The ZTV indicates that theoretical visibility of the proposed development from within the SLA will be widespread. The Knock of Braemoray and Hill of Aitnock will offer some areas of visual screening. Given there is limited tree cover and built form to provide screening actual visibility will closely reflect theoretical.</p>

²⁴ THC (2011) Assessment of Highland Special Landscape Areas, Drynachan, Lochindorb and Dava Moors SLA

Drynachan, Lochindorb and Dava Moors SLA	
Receptor	Drynachan, Lochindorb and Dava Moors SLA
	<p>However, views from, and immediately around, the Findhorn River Valley will be more limited due to areas of coniferous forestry and broadleaved woodland.</p> <p>There will be no direct effects on the Special Qualities of the SLA, yet there will be indirect effects on certain perceptual qualities of the including the “expansive views”, “broad panoramas” and “sense of solitude”, due to the introduction of further vertical features in the surrounding landscape.</p> <p>Operational turbines within, or visible from the SLA however, have already altered the wide expansive views and sense of isolation.</p> <p>Given that turbines have already altered the views in, and from, the SLA, and as there will be no direct effects on the Special Qualities, it is considered that the proposed development will not compromise the overall integrity of the designation by significantly affecting the qualities for which it has been designated.</p>

Proposed Mitigation

5.92 Measures to reduce effects upon the landscape resource and visual amenity were predominantly achieved through the design of the wind farm, as described in **Chapter 3: Design Evolution and Alternatives**.

Residual Operational Effects

5.93 Measures to reduce landscape effects and visual effects have been embedded into the design of the wind farm and the site restoration proposals. All residual effects are therefore as predicted in the assessment section above.

Cumulative LVIA (CLVIA)

5.94 The aim of a Cumulative Landscape and Visual Impact Assessment (CLVIA) is to “describe, visually represent and assess the ways in which a proposed windfarm would have additional impacts when considered together with other existing, consented or proposed windfarms” (Para. 55, SNH, 2012).

5.95 The cumulative assessment therefore focuses on the ‘additional’ cumulative change which may result from the introduction of a proposed wind farm. The cumulative assessment also makes reference to ‘total’ (also referred to as combined) cumulative effects, where these have the potential to be significant.

5.96 As with an LVIA, a CLVIA deals with cumulative landscape and visual effects separately.

Cumulative Operational Effects

Predicted Cumulative Effects during Operation

5.97 Existing wind farms and those under construction have been assessed as part of the LVIA baseline (these are listed in Table 5.2). This section sets out the assessment of effects arising from the proposed development in a potential future landscape in which proposed wind farms are assumed to be present. The list of wind farms was derived using the following parameters and in consultation with SNH, THC and MC:

- Turbines below 50m to tip are omitted;
- Scoping/Design stage schemes are omitted (with the exception of Ourack, due to its approximate distance of 8km from the site, and Berry Burn Extension which has been requested for inclusion by East Nairnshire Community Council); and
- Single turbines beyond 5km are omitted.

5.98 The potential future baseline has been split into two possible scenarios:

- Scenario 1 - operational, under construction and consented wind farms (for which there is a higher level of certainty); and
- Scenario 2 - Scenario 1 plus wind farms at appeal and scoping stage (for which there is a lower level of certainty).

5.99 These developments are listed in Table 5.41 below and shown on Figure 5.1.6. The cumulative cut off date was set on the 31st July 2020. Since that date an application was submitted on the 7th August 2020 for Berry Burn Extension. This wind farm has been assessed under scoping status in the CLVIA, and as such the scenario under which it has been considered (Scenario 2) has not changed. Paul’s Hill 2 was granted section 36 consent on 11th December 2020. This wind farm has been assessed under an appeal/public inquiry status. It represents an extension to the east of an existing wind farm, beyond 10km to the east of the proposed development. This change in status is unlikely to materially alter the findings of the CLVIA.

Table 5.41: Cumulative Wind Farms

Distance (km) ²⁵	Wind Farm	Status	Blade Tip Height (m)	Number of Turbines
Consented (included in Scenario 1 and 2 cumulative baseline)				
18.9	Meikle Hill	Consented	126.5	6
37.3	Hill of Towie 2	Consented	125	16
39.5	Aberarder	Consented	130	12
Appeal/Public Enquiry (included in Scenario 2 cumulative baseline)				
10.7	Clash Gour	Appeal/Public Inquiry	176	48
15.5	Paul’s Hill 2	Appeal/Public Inquiry	149.9	7

²⁵ This is an approximate distance taken between the approximate centre point of each wind farm.

Distance (km) ²⁵	Wind Farm	Status	Blade Tip Height (m)	Number of Turbines
23.1	Rothes - Phase 3	Appeal/Public Inquiry	225	29
Scoping Stage (included in Scenario 2 cumulative baseline)				
8	Ourack	Scoping	180	27
11.9	Berry Burn Extension	Scoping	149.9	9

in terms of effects on landscape character, this is unlikely to result in significant additional cumulative effects on landscape character.

5.104 From more remote upland areas to the south including LCTs within the Cairngorms National Park the pattern of visibility of the proposed development is limited and intermittent beyond 10km, typically focused to north facing upper hill flanks and summits. From these areas, consented, appeal and scoping stage wind farms in the eastern grouping will extend this group. The proposed development will add a further wind farm into large scale panoramic views. Therefore, and in terms of effects on landscape character, this is unlikely to result in significant additional cumulative effects on landscape character.

Table 5.42: Cumulative Landscape Effects

Cumulative Landscape Effects	
Receptor	LCT 291 Open Rolling Upland (which includes the site) and LCT 290 Upland Moorland and Forestry LCT
Description and Sensitivity	<p>Turbines within the eastern and western wind farm groups are located within these LCTs.</p> <p>Scenario 1: Meikle Hill (consented)</p> <p>Scenario 2: Additional proposed wind farms within these LCTs will include Clash Gour, Paul's Hill 2 (appeal) and Ourack and Berry Burn Extension (scoping stage). These schemes will extend the eastern wind farm group to the south-west within these LCTs. However, there is a higher level of uncertainty that this situation may be realised, given the appeal and scoping status of these wind farms.</p> <p>Overall sensitivity from LVIA: high to low</p>
Changes	<p>Scenario 1: Changes to the cumulative baseline are limited and as such there will be no notable additional cumulative effects.</p> <p>Scenario 2: Across the study area, wind farm developments tend to follow the Open Rolling Uplands and 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.</p> <p>The proposed development will follow this trend being located between the Hill of Glaschyle and appeal and scoping stage wind farms to the west of the eastern grouping and Tom nan Clach in the western grouping. Separation between the proposed development and these groups (by the Knock of Braemoray to the east and increased distance to the west with Tom Nan Clach over 10km distance) will be apparent in the more immediate landscape context. Increased forest cover will also limit the potential for cumulative interactions to be experienced particularly in the Upland Moorland and Forestry LCT. However, and at the larger scale, the proposed development will follow the wider pattern of wind farm development.</p> <p>The introduction of the proposed development will therefore increase the number of wind farms present within the area made up of the Open Rolling Uplands and Upland Moorland with Forestry LCTs. However, separation between the eastern</p>

5.100 Although all of these wind farms are considered in the cumulative assessment, the assessment focused on the relationship of the proposed development with the closest wind farms or groups of wind farms, with which significant cumulative effects are most likely. For the cumulative assessment, these groupings include:

- Tom nan Clach and Moy (both operational and considered in the primary LVIA baseline) referred to as the **west wind farm group**, with this grouping extending further west beyond 20km; and
- Hill of Glaschyle, Berry Burn, Paul's Hill and Rothes Phase I and Phase II (operational); Meikle Hill (consented); Clash Gour, Paul's Hill 2 (appeal); Ourack and Berry Burn Extension (scoping stage) referred to as the **east wind farm group** with this grouping extending further east beyond 20km.

Landscape Effects

5.101 This section describes the cumulative landscape effects resulting from the proposed development on areas classified into LCTs and landscape designations. The baseline for this assessment is set out in the LVIA baseline with the inclusion of the cumulative wind farms, set out in Table 5.2.

5.102 So that the CLVIA is proportionate and focuses on potentially significant cumulative landscape effects, not all LCTs and landscape designations have been carried forward into the cumulative assessment. LCTs and designated landscapes where there is limited potential for cumulative interactions have been omitted from the cumulative landscape assessment as the potential for significant 'additional' cumulative visual effects is much reduced. The detailed cumulative visual assessment therefore includes the following landscape receptors:

- LCT 291 Open Rolling Upland;
- LCT 290 Upland Moorland and Forestry; and
- Drynachan, Lochindorb and Dava Moors SLA.

5.103 From lower lying and more settled LCT to the north the pattern of woodland somewhat limits the potential for views to the south (particularly from the Narrow Wooded Valley LCT and the Rolling Farmland and Forests LCT). Where open views are available, consented, appeal and scoping stage wind farms in the eastern grouping will extend this group. The proposed development will add a further wind farm on the distant moorland horizons. Therefore, and

Cumulative Landscape Effects	
	<p>and western wind farm groupings will remain and, in a more strategic sense, the proposed development will meet with the emerging pattern of wind farm development in the transitional zone between the mountains of the Cairngorm or Monadhliath massifs to the south and the coastal lowlands to the north. The site is located within the area which the SNH 'The Landscapes of Scotland' map calls Monadhliaths, and where there is an established association with appropriate wind farm development, avoiding the lower more settled landscapes of Moray to the north or the Spey to the south.</p> <p>Judgements: Scale: small; Geographical Extent: medium; Magnitude of Change: low.</p>
Effect and Significance	<p>Scenario 1 and 2: Overall, the effect of the proposed development in either cumulative scenario is judged to be minor (not significant).</p>
Receptor	Drynachan, Lochindorb and Dava Moors SLA
Description and Sensitivity	<p>Both operational schemes within the western wind farm group are located in the SLA.</p> <p>Scenario 1: No additional wind farm development within the SLA.</p> <p>Scenario 2: The scoping stage Ourack will extend the eastern wind farm group and bring turbines into the north-eastern parts of the SLA. Other appeal and scoping stage wind farms in the eastern wind farm grouping will extend the influence of wind farms in views to the north and north-east of the SLA. However, there is a higher level of uncertainty that this situation will be realised, given the appeal and scoping status of these wind farms.</p> <p>Overall sensitivity: high</p>
Changes	<p>Scenario 1: Changes to the cumulative baseline are limited as such there will be no notable additional cumulative effects.</p> <p>Scenario 2: There will be no direct effects associated with the proposed development on the Special Qualities of the SLA. However, there will be indirect effects on certain perceptual qualities of the landscape including the expansive horizons, broad panoramas and sense of vastness and isolation, due to the introduction of further vertical features in the landscape to the north of the SLA. Operational turbines within, or visible from the SLA have, however, already altered the wide expansive views and sense of isolation and application and scoping stage schemes within the eastern wind farm grouping will further extend the influence of wind farms including bringing turbines into the SLA (Ourack).</p> <p>Given that turbines have already altered the views from the SLA to the north and as there will be no direct effects on the Special Qualities, it is considered that the proposed development will not compromise the overall integrity of the designation by significantly affecting the qualities for which it has been designated.</p>

Visual Effects

- 5.105 This section describes the cumulative visual effects resulting from the proposed development on selected representative viewpoints. The baseline for this assessment is set out in the LVIA sections with the inclusion of the cumulative wind farms, set out in Table 5.2.
- 5.106 Figures 5.17a to 5.18 show the ZTV of the proposed development in combination with the ZTVs of grouped wind farms considered in the cumulative assessment. These figures show:
- **East wind farm group comparative ZTV (Figures 5.1.7a and 5.1.7b):** For the scenario 1 comparative ZTV shown on Figure 5.17a, the ZTV highlights that the key areas of ZTV overlap are focused within the centre of the study area, primarily within 15km, however visibility is also present within the northern part of the study area, extending from Nairn to Kinloss. There is also intermittent combined visibility around Meikle Hill and Cairn Uish to the east, and along the north-western flank of the Hills of Cromdale to the south-east. For the scenario 2 comparative ZTV, shown on Figure 5.17b, the areas of ZTV overlap, where there will be combined effects, are very similar and indicate a marginal extension of effects, most notably within the central and north-western parts of the study area.
 - **West wind farm group comparative ZTV (Figure 5.1.8):** This figure highlights that the proposed development extends the pattern of ZTV coverage across the study area primarily within the central and northern parts of the study area, when compared to the with the existing Tom nan Clach and Moy ZTV coverage. Visibility of the proposed development however will be intermittent in nature and located between areas where there is overlap between the ZTVs for the existing western schemes and that of the proposed development.
- 5.107 The visualisations produced for each viewpoint in Figures 5.2.1 to 5.2.18 include cumulative schemes in the wirelines below the baseline photography, in accordance with SNH Visualisation Standards. However, so that the CLVIA is proportionate and focuses on potentially significant cumulative visual effects, not all viewpoints / settlements / routes have been carried forward into the cumulative assessment. Viewpoints / settlements / routes where the wirelines reveal limited potential for cumulative interaction with consented and proposed schemes have been omitted from the cumulative visual assessment as the potential for significant 'additional' cumulative visual effects is much reduced. The detailed cumulative visual assessment therefore includes the following visual receptors:
- Viewpoint 2 - Little Aitnoch;
 - Viewpoint 6 - A939, west of Aitnoch;
 - Viewpoint 9 - Knock of Braemoray;
 - Viewpoint 13 - A940 Auchearn
 - Viewpoint 16 - Carn Kitty;
 - Viewpoint 17 - Carn Allt Laoigh;
 - Viewpoint 18 - Carn a'Ghille Chearr;
 - A939 Nairn to Tomintoul (route);
 - A940 Forres to Dava (route); and

- Dava Way (route).

Table 5.43: Cumulative Visual Effects

Cumulative Visual Effects	
Receptor	Viewpoint 2: Little Aitnoch
Description and Sensitivity	<p>Scenario 1: There will be no changes to the cumulative baseline seen from this viewpoint under this scenario.</p> <p>Scenario 2: The key change to the cumulative baseline in this scenario will be views of Ourack to the east, which will be seen in successive views (partially filtered by intervening foreground deciduous woodland) and will bring turbines in the eastern wind farm group in closer proximity to the viewpoint. Some limited upper turbine tips of the Clash Gour wind Farm (appeal stage) will be theoretically visible in combined views with the proposed development, however, intervening foreground woodland will screen views of this scheme from this viewpoint location.</p> <p>Overall sensitivity from LVIA: high</p>
Changes	<p>Scenario 1: No additional cumulative effects under this scenario.</p> <p>Scenario 2: The proposed development will introduce turbines in close proximity in the view to the north-east, seen in combined views with the more distant operational Hill of Glaschyle (limited views of upper turbine tips) and successive views with Ourack to the east. The proposed development will read as a clearly distinct and separate group from Ourack with foreground deciduous woodland helping to provide separation. Whilst under this scenario wind farms will be in closer proximity to the north and east of the view, intervening deciduous woodland cover largely screens views of the scoping stage Ourack. As such, the potential for additional significant cumulative effects, from this viewpoint location, is limited.</p> <p>Judgements: Scale: small; Geographical Extent: small; Magnitude of Change: low</p>
Effect and Significance	The cumulative visual effect of the proposed development on views seen from this location is judged to be minor (not significant) under both cumulative scenarios.
Receptor	Viewpoint 6: A939, west of Aitnoch
Description and Sensitivity	<p>Scenario 1: There will be no changes to the cumulative baseline from this viewpoint under this scenario.</p> <p>Scenario 2: The key changes to the cumulative baseline in this scenario will be views of Ourack, Berry Burn Extension (both scoping stage) and Clash Gour (appeal stage) to the east which will be seen in combined views with Paul's Hill and Berry Burn. This will extend the eastern wind farm group and bring turbines in the eastern wind farm group in closer proximity to the viewpoint.</p> <p>Overall sensitivity from LVIA: medium-high</p>

Cumulative Visual Effects	
Changes	<p>Scenario 1: No additional cumulative effects under this scenario.</p> <p>Scenario 2: The proposed development will introduce turbines in close proximity in the view to the north, seen in successive views with the now larger eastern wind farm grouping. The proposed development will be the closest proximity wind farm in the view and will be seen as a clearly distinct and separate group from the now larger eastern wind farm group. The proposed development will extend the influence of wind farms to the north, with the influence of wind farms in successive views to the east extended under scenario 2. Overall, the additional cumulative scale of change is judged to be medium.</p> <p>Judgements: Scale: medium; Geographical Extent: small; Magnitude of Change: medium</p>
Effect and Significance	The cumulative visual effect of the proposed development on views seen from this location is judged to be moderate (significant) under scenario 2.
Receptor	Viewpoint 9: Knock of Braemoray
Description and Sensitivity	<p>Scenario 1: The key change to the cumulative baseline will be longer distance views of the Meikle Hill, to the north-east which will marginally extend the eastern wind farm grouping.</p> <p>Scenario 2: Key changes to the cumulative baseline under this scenario include views of Glash Gour (appeal stage) and Ourack (scoping stage) which will extend the eastern wind farm grouping bringing turbines in closer proximity views to the east and south-east of the Knock of Braemoray. Further scoping and appeal stage schemes will extend this eastern grouping in longer distance views to the east from the summit.</p> <p>Overall sensitivity from LVIA: high</p>
Changes	<p>Scenario 1 Long distance views of Meikle Hill to the north-east will not result in a notable change to the cumulative baseline.</p> <p>Scenario 2: The proposed development will introduce further wind turbines in close distance views to the west. The proposed development will be seen in front of longer distance views of Tom Nan Clach, considered in the primary LVIA baseline and in successive views from the now larger eastern wind farm grouping.</p> <p>Whilst the proposed development will be read as a distinct and separate scheme, given the increased presence (and closer proximity) of wind turbines to the west, east and south-east of this hill, and the role the proposed development plays in contributing to this effect, the additional cumulative scale of change is judged to be medium.</p> <p>Judgements: Scale: medium; Geographical Extent: small; Magnitude of Change: medium</p>

Cumulative Visual Effects	
Effect and Significance	The cumulative visual effect of the proposed development on views seen from this location is judged to be moderate (significant) under Scenario 2. In terms of total cumulative effects, and under scenario 2, cumulative effects are on the borderline to those which may be considered significant. The influence of wind farms in views to the east and south-east is becoming more widespread (but noting the status of wind farms in the larger eastern grouping at appeal and scoping stage). Views south towards the Cairngorms National Park remain free of wind farm development. The proposed development will increase the influence of wind farms in views to the west, from this minor summit.
Receptor	Viewpoint 13: A940 Auchearn
Description and Sensitivity	Scenario 1: No notable change to the baseline. Scenario 2: Under this scenario Ourack will be theoretically visible in successive and longer distance views to the south-east. However, foreground vegetation, including a beech hedge and coniferous forest on the middle-distance horizon, will partially screen views of this scheme, from this location. Overall sensitivity from LVIA: high
Changes	Scenario 1: No notable change to the baseline. Scenario 2: The proposed development will be apparent in longer distance successive views to the south-west. Intervening vegetation will play a role in screening the proposed development and Ourack, in medium to longer distance successive views from this road. Judgements: Scale: small; Geographical Extent: small; Magnitude of Change: low
Effect and Significance	The cumulative visual effect of the proposed development on views seen from this location is judged to be minor (not significant) under Scenario 2.
Receptor	Viewpoint 16: Carn Kitty
Description and Sensitivity	Scenario 1: From this elevated viewpoint, which is located on a minor summit immediately south-east of the operational Berry Burn Wind Farm, the consented Meikle Hill and Hill of Towie 2 will add further wind turbines in longer distance views to the north-east and east. The consented Aberarder will also be perceptible in long distance views east. Scenario 2: The key change under scenario 2 will be close proximity views of scoping and appeal stage wind farms including Clash Gour, Berry Burn Extension, Paul's Hills 2 and Ourack, which surround the viewpoint to the west, north and east and expand the eastern wind farm grouping. Overall sensitivity from LVIA: medium
Changes	Scenario 1: Longer-distance views of consented schemes will not result in a notable change the baseline or significant cumulative interactions with the proposed development. Scenario 2: Under this scenario the influence of wind farms will have notably increased from this viewpoint, with scoping and appeal stage wind turbines seen in short distance views just beyond the operational Berry Burn and Paul's Hill Wind Farms. The proposed

Cumulative Visual Effects	
	development will read as a distinct scheme seen in longer distance views to the west, contained within and seen beyond the horizontal field of view occupied by Berry Burn (operational) and Clash Gour (appeal stage). Whilst this will further increase the influence of wind farms in views from this location, this is not judged to result in a cumulative scale of change greater than small. Closer proximity wind turbines are more likely to draw the eye and the development will read as a distinct scheme in longer distance views, and will not extend the horizontal view occupied by turbines. Judgements: Scale: small; Geographical Extent: small; Magnitude of Change: low
Effect and Significance	The cumulative visual effect of the proposed development on views seen from this location is judged to be minor (not significant) under Scenario 2. In terms of total cumulative effects, and under scenario 2, the influence of wind farms in views to the west, east and north is widespread and total effects are considered to be significant. Whilst the proposed development will add to this effect, it is not judged to be the scheme which tips the balance towards total cumulative effects being considered significant.
Receptor	Viewpoint 17: Carn Allt Laoigh
Description and Sensitivity	Scenario 1: Key changes in this scenario include long distance views of Meikle Hill to the north-east, within the eastern wind farm group. Scenario 2: Key changes to the cumulative baseline under this scenario include views of Ourack (scoping stage) in longer distance views to the north-east, which will be seen in front of Berry Burn, Clash Gour (appeal stage) and Berry Burn Extension (scoping stage). Turbines in Ourack will bring the eastern grouping closer to the viewpoint. Further scoping and appeal stage schemes will extend this eastern grouping in longer distance views to the north-east from this high point. Overall sensitivity from LVIA: high
Changes	Scenario 1: The proposed development will introduce turbines into middle distance views to the north-east. Long distance views of Meikle Hill to the north-east and Aberarder to the south-west will not result in a notable change to the cumulative baseline or significant cumulative interactions with the proposed development, under this scenario. Scenario 2: The proposed development will introduce further wind turbines in longer distance views to the north-east. The proposed development will be seen in combined views with wind farms to the east (within the now larger eastern grouping) and successive views with operational wind farms to the west (within the western grouping). There will be a slight gap between the proposed development and the larger emerging cluster of wind farms within the eastern grouping, which includes the operational Hill of Glaschyle on its western extent which was considered in the primary LVIA From this viewing angle and distance the proposed development is likely to be read as part of this larger wind farm grouping (with intervening landform providing slight breaks between wind farms at the western extent of this grouping) and certainly viewed in the context of a section of the horizon which has been altered by various wind farm schemes, of varying sizes. The additional cumulative scale of change is therefore judged to be small. Judgements: Scale: small; Geographical Extent: small; Magnitude of Change: low

Cumulative Visual Effects	
Effect and Significance	The cumulative visual effect of the proposed development on views seen from this location is judged to be minor (not significant) under both scenarios.
Receptor	Viewpoint 18: Carn a’Ghille Chearr
Description and Sensitivity	<p>Scenario 1: Key changes in this scenario include long distance views of Meikle Hill to the north within the eastern wind farm group. Aberarder and Hill of Towie also add further, longer distance views on turbines seen in the context of operational schemes.</p> <p>Scenario 2 Key changes in this scenario include views of Ourack to the north which will extend the eastern wind farm grouping further west in views from this hill summit. Further scoping and appeal stage schemes such as Berry Burn Extension, Clash Gour, Paul’s Hill 2 and Rothes Phase 3 will extend the eastern wind farm grouping further east, increasing the horizontal extent of the view that is occupied by wind farms in views to the north.</p> <p>Overall sensitivity from LVIA: high</p>
Changes	<p>Scenario 1 The proposed development will introduce turbines into longer distance views to the north-west. The proposed development will appear as a separate and distinct scheme from slightly larger eastern wind farm group, which includes Meikle Hill under this scenario.</p> <p>Scenario 2 The proposed development will introduce turbines in longer distance views to the north-west, in successive views between wind farms in the west (within the western grouping) and in combined views with wind farms to the east (within the now larger eastern grouping). The proposed development will be seen behind, and partly contained within, the horizontal field of view occupied by Ourack. From this viewing distance and angle, the proposed development is likely to be read as part of this larger eastern wind farm grouping, marginally extending this group further west. The proposed development will be viewed in the context of a section of the horizon which has been altered by various wind farm schemes, of varying sizes, outside of the Cairngorms National Park. Although the proposed development will extend the eastern wind farm group to the west of this grouping, it will be a relatively subtle change to the existing wind farm context visible in this view, under this scenario. The additional cumulative scale of change is judged to be small.</p> <p>Judgements: Scale: small; Geographical Extent: small; Magnitude of Change: low</p>
Effect and Significance	<p>The cumulative visual effect of the proposed development on views seen from this location is judged to be minor (not significant) under both scenarios.</p> <p>Under scenario 2, the increased presence of wind farms in longer distance views to the north, outside of the Cairngorms National Park, is notable and potentially on the borderline of being considered significant in terms of total cumulative effects. However, the contribution the proposed development makes to this effect is not considered to be significant.</p>
Receptor	A939 Nairn to Tomintoul
Description and Sensitivity	<p>Scenario 1: There will be no notable change to the cumulative baseline apart from long distance views of the Meikle Hill, to the east, from a section of the A939 to the north of the site. In sequential views from the route when travelling south from Nairn, views of Meikle Hill will slightly enlarge the eastern wind farm group. However, views are</p>

Cumulative Visual Effects	
	<p>likely to be limited due to surrounding forestry and woodland along the route this section of the route.</p> <p>Scenario 2: In sequential views from the route, when travelling between Nairn and the northern boundary of the CNP, the eastern wind farm group will be further enlarged by scoping and appeal stage wind farms including Ourack (scoping stage) which will be visible along a section of the route around Aitnoch (refer to Viewpoint 6) and the along the stretch south of Dava and the CNP boundary. Views of Ourack will bring turbines into closer proximity views, to the east of the route. Rising landform to the east of the road, including the Knock of Braemoray and Carn Biorach, will play a varying role in obscuring views of the larger eastern wind farm grouping (as demonstrated in Viewpoints 12 and 14) with typically limited visibility of upper turbine tips for Ourack from this section of road immediately north of the CNP boundary.</p> <p>Overall sensitivity from LVIA: high</p>
Changes	<p>Scenario 1 and 2: When travelling in both directions along the A939, the proposed development will be visible in longer distance direct (typically over 5km distance) to more oblique views from the section of the route that runs immediately along the western site boundary.</p> <p>When travelling north, on the departure from the CNP, the proposed development will be seen in longer distance direct views and the rising landform to the east of the road will largely screen views of the now larger eastern wind farm grouping under scenario 2. When approaching the site from the south, the proposed development will be seen in direct views along with successive views of the now larger eastern wind farm grouping (refer to Viewpoint 6). As road users pass the site, roadside vegetation and the rising landform of Cairn Duhie will increasingly screen combined views of the larger eastern wind farm grouping.</p> <p>When travelling north longer distance views of the wider cumulative schemes tend to be limited by woodland and landform, so the opportunity for significant cumulative sequential interactions will be limited.</p> <p>Beyond a relatively limited stretch of the road around Aitnoch, which offers more open and successive sequential views of the proposed development and the larger eastern wind farm grouping considered under scenario 2, cumulative sequential interactions are somewhat limited. As such, and overall, the additional cumulative scale of change is judged to be small.</p> <p>Judgements: Scale: small; Geographical Extent: medium; Magnitude of Change: low</p>
Effect and Significance	The cumulative visual sequential effect of the proposed development on this route is judged to be minor (not significant) under both scenarios.
Receptor	A940 Forres to Dava
Description and Sensitivity	<p>Scenario 1: The key change to the cumulative baseline will be long distance views of the Meikle Hill, to the east, from a section of the A940 between Forres and Logie to the north of the site. In sequential views from the route when travelling south from Forres, the eastern wind farm group will be slightly enlarged by turbines within Meikle Hill. However, these views will be limited and intermittent as forestry and woodland along the route provide screening in views to the south-east.</p>

Cumulative Visual Effects	
	<p>Scenario 2:</p> <p>Key changes to the cumulative baseline in this scenario will be views of Clash Gour and Ourack when travelling south along the route. However, as with Scenario 1, views will be limited due to surrounding forestry and woodland along the A940. From the southern extents of the route, the Knock of Braemoray will largely screen the larger eastern wind farm grouping in views to the east.</p> <p>Overall sensitivity from LVIA: high</p>
Changes	<p>Scenario 1 and 2</p> <p>When travelling southwards along the route, the proposed development will be visible along very limited sections of the route, in slightly oblique longer distance sequential views with wind farms including Hill of Glaschyle (operational), Clash Gour (appeal stage) and Ourack (scoping). The proposed development will appear as a distinct and separate group of turbines in views to the south-west with the larger eastern grouping seen in views to the south-east. The opportunity for sequential and successive views is limited, from short sections where forestry and woodland along the A940 do not screen views. As road users pass the pass to the east of the site, the Knock of Braemoray screens views of the larger eastern wind farm grouping under scenario 2.</p> <p>Judgements: Scale: small; Geographical Extent: small; Magnitude of Change: low</p>
Effect and Significance	The cumulative visual sequential effect of the proposed development on this route is judged to be minor (not significant) under scenario 1 and 2.
Receptor	Dava Way
Description and Sensitivity	<p>Scenario 1:</p> <p>The key change to the cumulative baseline will be long distance views of Meikle Hill, in views to the east along more open sections of this route to the north of the site. However, intervening landform and areas of forestry along and near the route will limit the opportunity for views of this scheme from the Dava Way.</p> <p>Scenario 2:</p> <p>In sequential views from the route when travelling between Beachans and the section north of the CNP, the most notable change will be views of Ourack in views to the east. Ourack will bring turbines closer to the section of the route around Dava. Clash Gour, Berry Burn Extension and Paul's Hill 2 will also extend the eastern wind farm grouping.</p> <p>Overall sensitivity from LVIA: high</p>
Changes	<p>Scenario 1 and 2:</p> <p>The proposed development will be visible in middle to longer distance views to the north-west from the southern part of the route (south of Dava Junction). Refer to Viewpoint 12 and 14. From this section successive views with Ourack, which will appear closer at this section of the route on its eastern side, will be available. The rising landform to the east of the Dava Way however will play a role in screening this wind farm with typically upper tips of a limited number of turbines visible. As recreational users of the route continue north other wind farms in the eastern grouping will appear more prominent and closer to the route once around the lower eastern flank of the Knock of Braemoray. This landform will screen views of the proposed development, to the west as the Dava Way passes the site. North of the Knock of Braemoray, woodland alongside the Dava way will increasingly limit the opportunity for successive views of wind farms including the proposed development (to the south-west) and the larger eastern grouping of wind farm (to the south-east).</p>

Cumulative Visual Effects	
	<p>As such, the potential for successive sequential cumulative views of the proposed development and the larger eastern wind farm grouping is limited.</p> <p>Overall, the additional cumulative scale of change is judged to be small.</p> <p>Judgements: Scale: small; Geographical Extent: small; Magnitude of Change: low</p>
Effect and Significance	The cumulative visual sequential effect of the proposed development on this route is judged to be minor (not significant) under scenario 1 and 2.

Residual Cumulative Effects during Operation

- 5.108 Measures to reduce cumulative landscape and visual effects have been embedded into the design of the wind farm and the site restoration proposals. All residual effects are therefore as predicted in the assessment sections above.

Further Survey Requirements and Monitoring

- 5.109 No monitoring is proposed for landscape and visual effects.

Summary of Significant Effects

- 5.110 Table 5.44 below summarises the predicted significant effects of the proposed development on the landscape and visual amenity of the study area.

Table 5.44: Summary Of Significant Landscape And Visual Effects

Receptor	Primary LVIA Assessment Findings	Scenario 1 Cumulative Assessment Findings	Scenario 2 Cumulative Assessment Findings
Landscape effects of Construction on the Site	Moderate (Significant)	N/A	N/A
Operational effects on Landscape Receptors			
Operational Landscape effects on the Site	Major (significant)	N/A	N/A
Open Rolling Upland (291) LCT	Major (significant) for the site, moderate (significant) for areas of the Open Rolling Upland (291) LCT within 5km and minor (not significant) for the rest of the LCT.	Minor (not significant)	Minor (not significant)
Operational effects on visual receptors			

Receptor	Primary LVIA Assessment Findings	Scenario 1 Cumulative Assessment Findings	Scenario 2 Cumulative Assessment Findings
VP1 - A939 South of Ferness Village	Major (significant)	N/A	N/A
VP2 - Little Aitnoch	Major (significant)	Minor (not significant)	Minor (not significant)
VP3 - Hill track to Loch Kirkcaldy	Major (significant)	N/A	N/A
VP5 - A940, above Kerrow	Major (significant)	N/A	N/A
VP6 - A939, west of Aitnoch	Major (significant)	N/A	Moderate (significant)
VP8 - Ardclach Bell Tower	Major (significant)	N/A	N/A
VP9 - Knock of Braemoray	Major (significant)	N/A	Moderate (significant)
VP10 - Cairn Glas Brae on the A939	Moderate (significant)	N/A	N/A
VP11 - B9007, Old Military Road	Moderate (significant)	N/A	N/A
VP12 - Drumguish Croft	Major (significant)	N/A	N/A
VP13 - A940, Auchearn	Moderate (significant)	N/A	Minor (not significant)
VP14 - A939 and Dava Way	Moderate (significant)	N/A	N/A
VP15 - Carn nan Gabhar above Lochindorb	Moderate (significant)	N/A	N/A
VP17 - Carn Allt Laoigh	Moderate (significant)	Minor (not significant)	Minor (not significant)
Dava	Major (significant) for a limited number of properties on the fringes of the settlement, with open views to the north-west.	N/A	N/A
A939 Nairn to Tomintoul	Major (significant). This will be focused to the section of route which passes to the immediate west of the site and	Minor (not significant)	Minor (not significant)

Receptor	Primary LVIA Assessment Findings	Scenario 1 Cumulative Assessment Findings	Scenario 2 Cumulative Assessment Findings
	to the north of the CNP boundary.		
A940 Forres to Dava	Moderate (significant) as the route passes to the east of the site.	Minor (not significant)	Minor (not significant)
Dava Way	Moderate (significant) between Glaschoil and Dava.	Minor (not significant)	Minor (not significant)

5.111 The summary below outlines the potential significant effects identified within each scenario of the assessment.

Primary Landscape and Visual Assessment

5.112 The design process adopted in developing the wind farm layout has reduced or avoided potential adverse environmental effects, as discussed in **Chapter 3: Design Evolution and Alternatives**, particularly through limiting the size and number of turbines. A relatively compact cluster of turbines is proposed, arranged around the summit of Cairn Duhie, yet avoiding the highest point in the site, and with an infrastructure layout designed to respond to the form of the hill.

Significant Landscape Effects

5.113 Significant effects are predicted on the landscape resource of the site itself during construction (**moderate**) and operation (**major**).

5.114 Significant effects on landscape character are predicted for the Open Rolling Upland (291) LCT, in which the proposed development is located at the site level (**major**) with **moderate** effects locally within 5km of turbines. Despite the high sensitivity of this LCT, it is a large-scale landscape with a simple landcover of moorland and forestry. Human influences across the landscape including settlements, roads and power lines (particularly in proximity to the site) are also clearly apparent. The presence of hills helps contain the site to the east and south and there are extensive areas of forestry to the north. For most commercial wind farms in the UK, having some residual significant landscape (and visual) effects is unavoidable, and the level and distribution of significant landscape and visual effects for the proposed development are no more than will be expected for a commercial size wind farm. No significant effects on other LCTs are predicted.

Significant Visual Effects

5.115 Visibility is variable across the local study area, with landform, commercial forestry and deciduous woodland providing screening or filtering views from many locations. Significant effects on views are predicted at fourteen of the representative viewpoints and are contained

within 15km of the site, which is unsurprising given the proximity of most of the viewpoints to the proposed development, and given they were specifically selected to indicate locations where views will alter to a significant degree. These significant effects are predicted for a number of receptors including some effects on local residents, road users passing the site and on approach to it on the A939 as well as road users on the A940 and B9007, recreational receptors using the Dava Way and on hill summits, and visitors to Ardlach Bell Tower.

5.116 A significant effect is predicted to occur on Dava as a settlement (**major**) but noting this will be limited to a small number of properties on the edge of this small settlement, with more open views to the north-west. Significant sequential effects are also predicted from sections of the A939, A940 and the Dava Way long-distance walking route all of which pass within 5km of the site.

5.117 Visual effects of significance are not unexpected, nor are they in any way unique to the wind farm in question.

Effects on designated landscapes

5.118 The proposed development will not significantly affect the overall integrity of any landscape designations by significantly affecting the special qualities for which they have been designated. It is concluded that the proposed development, located outside the Drynahan, Lochindorb and Dava Moors SLA, will not affect the special qualities of the SLA to the degree that its intrinsic values or reasons for designation will be compromised, or such that the consenting of the project will require the boundary of the designated area to be amended. Some significant effects on landscape character are recognised local to the wind farm site around Dava Moor within 5km of the site. The Dava Moor landscape in the vicinity of the site is less remote, empty, wild and tranquil than other parts of the SLA, given the presence of A roads and traffic, views of overhead lines and other wind farms, as well as the forestry to the north.

5.119 With regards to CNP, located approximately 7.5km away to the south of the site, there is relatively limited theoretical visibility, and it is concluded that neither the overall integrity of the designation, nor the special landscape qualities for which it has been designated will be significantly affected. Further information on effects of the Special Landscape Qualities of the CNP is provided in Appendix 5.2.

Significant Cumulative Landscape Effects

5.120 No significant additional cumulative landscape effects are predicted.

5.121 Across the study area, wind farm developments tend to be located within the Open Rolling Uplands and 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.

5.122 The proposed development will follow this trend being located between the Hill of Glaschyle and appeal and scoping stage wind farms to the west of the eastern group of wind farms, and Tom nan Clach in the western group. Separation between the proposed development and the

groups of wind farms to the east and west (by the Knock of Braemoray to the east and distance to the west, with Tom Nan Clach being over 10km away) will be apparent in the more immediate landscape context.

5.123 Forest cover will limit the potential for cumulative interactions to be experienced in the Upland Moorland and Forestry landscape character types.

5.124 At the larger scale, the proposed development follows the wider pattern of wind farm development in the study area, whilst maintaining separation between emerging wind farm clusters.

Significant Cumulative Visual Effects

5.125 Views of wind farms in this part of Scotland are not unusual, and they have become an accepted part of wider views seen in this area, given they have been present for some time.

5.126 Significant cumulative visual effects are predicted in the CLVIA at two of the eighteen viewpoints - Viewpoint 6: A939 west of Aitnoch and Viewpoint 9: Knock of Braemoray. No significant cumulative visual effects are predicted for the routes that were assessed in the CLVIA.

5.127 The significant effects on Viewpoint 6: A939 west of Aitnoch and Viewpoint 9: Knock of Braemoray are predicted primarily due to the role the proposed development will have in extending the influence of wind farms in views, together with the increasing eastern wind farm group. From Viewpoint 6: A939 west of Aitnoch the proposed development will introduce turbines in close proximity within views to the north and will increase the overall existing influence of wind farms as it will be seen in successive views of the larger eastern wind farm group to the east. From Viewpoint 9: Knock of Braemoray, significant effects are predicted to arise due to its proximity to the site and the array of wind farms visible to the north, east and west, resulting in wind farms being present in various directions, as experienced from the hill.

5.128 In other places, where significant effects are not predicted, there are local features which reduce cumulative effects, particularly the Knock of Braemoray, and also forestry and woodland to the north of the site. Elsewhere, the separation between Cairn Duhie and other cumulative wind farms helps to reduce cumulative effects.

Chapter 6: Cultural Heritage and Archaeology

6. Cultural Heritage and Archaeology

Introduction

6.1 The cultural heritage of an area comprises archaeological sites, historic buildings, historic landscapes and other historic environment features (the physical remains of the historic environment, generally termed heritage assets), as well as intangible cultural associations. These include features or places which have the capacity to provide information and sensory perceptions about past human activity, or which have cultural significance due to associations with sacred space, literary or artistic work, folklore or historic events. The setting of an asset within the wider landscape contributes to the understanding and appreciation of its cultural heritage significance, and how it is experienced.

6.2 This Chapter assesses the potential effects of the construction and operation of the proposed Cairn Duhie Wind Farm (hereafter referred to as the proposed development) on heritage assets within the site and surrounding area. A full description of the proposed development is given in Chapter 4: Development Description. The assessment has included consideration of all known designated and non-designated heritage assets within the site, all nationally significant heritage assets within 5km of the wind turbines, and heritage assets of national significance within 10km of the wind turbines identified in consultation with statutory consultees (Figure 6.1 and 6.2).

Previous Archaeological Work

6.3 This assessment has been based on a range of data, including known heritage assets recorded by regional and national bodies, readily available archaeological reports and publications and the results of a walkover survey of the site carried out by CFA Archaeology Ltd in 2012.

6.4 Archaeological surveys have taken place on the site previously to inform previous wind farm applications, including the consented development. These are detailed further below.

Kirkdale Archaeology Walkover and Desk-Based Assessment (2004)

6.5 In 2004, Kirkdale Archaeology conducted a walkover and heritage impact assessment for a feasibility study on behalf of Environmental Resource Management Ltd. Kirkdale's walkover identified 100 features, including two prehistoric hut circles, modern grouse butts and post-medieval farmsteads. The site survey carried out by Kirkdale was larger than the proposed development, extending to the south of the site boundary.

CFA Archaeology Cultural Heritage Chapter (2013)

6.6 In 2012, CFA Archaeology Ltd carried out an additional walkover for the Environmental Impact Assessment (EIA) of the consented development. CFA Archaeology Ltd identified a number of sites within the current site boundary, including an additional 26 sites to the 100 that were previously identified by Kirkdale.

6.7 The historic development of the site and study areas is discussed in the context of the wider region to predict the direct impact on any known or potential unknown archaeological remains within the site and indirect impacts on the setting of assets within the site and study areas as appropriate. Measures necessary to safeguard or record any assets potentially affected by the proposed development are suggested.

6.8 The historic environment resource includes the following types of designated assets:

- World Heritage Sites;
- Scheduled Monuments;
- Listed Buildings;
- Inventoried Battlefields;
- Conservation Areas; and
- Inventoried Gardens and Designed Landscapes (GDLs).

6.9 Within the list above, Category A listed buildings are considered to be of national importance and Conservation Areas are either of regional or local importance. Category B listed buildings are considered of regional importance, and Category C listed buildings of local importance (Scottish Natural Heritage and Historic Environment Scotland EIA Handbook, 2018¹).

6.10 In addition, the following non-designated assets are also included in this assessment:

- local and regional archaeological sites and finds listed within the Historic Environment Record (HER) as provided by The Highland Council (THC) and Moray Council; and
- other buildings and structures of historic or architectural importance listed within the HER.

6.11 This assessment has been undertaken by SLR Consulting Ltd, which is a Registered Organisation with the Chartered Institute for Archaeologists (CIfA).

6.12 The chapter is supported by Appendix 6.1: Gazetteer of Sites within the Inner Study Area and Figures 6.1 - 6.5 are referenced in the text where relevant.

¹ Available at <https://www.nature.scot/sites/default/files/2018-05/Publication%202018%20-%20Environmental%20Impact%20Assessment%20Handbook%20V5.pdf>. Note that Scottish Natural Heritage (SNH) was renamed to NatureScot in August 2020.

Planning

Legislation, Policy, Regulations and Guidance

Legislation

- 6.13 The assessment has been undertaken in accordance with the following legislation:
- The Ancient Monuments and Archaeological Areas Act 1979;
 - The Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997; and
 - The Historic Environment (Amendment) (Scotland) Act 2011.

Policy

- 6.14 The Scottish Government and Historic Environment Scotland (HES) have issued a number of statements of policy with respect to managing the historic environment in the planning system. In particular Scottish Planning Policy paragraph 145 stresses the importance of maintaining the integrity of the setting for scheduled monuments. The following policies are of relevance to the proposed development:
- Scottish Planning Policy (2014), especially *Valuing the Historic Environment* paragraphs 135-151;
 - Historic Environment Circular 1 May 2016;
 - Historic Environment Policy for Scotland May 2019; and
 - Planning Advice Note 2/2011: Planning and archaeology.

Regulation

- The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017.

Guidance

- 6.15 Relevant pieces of guidance applied within this assessment have been published by HES, in conjunction with SNH², and by the professional archaeological body the Chartered Institute for Archaeologists. These publications are:
- HES guidance on Managing Change in the Historic Environment: Setting 2016b;
 - SNH and HES Environmental Impact Assessment Handbook: Guidance for competent authorities, consultation bodies, and others involved in the Environmental Impact Assessment Process in Scotland (2018); and
 - Chartered Institute for Archaeologists Standard and Guidance for Historic Environment Desk Based Assessment (2014).
 - A Guide to Climate Change Impact on Scotland's Historic Environment (Harkin et al, 2019).

Scope of Assessment

- 6.16 During the consultation with statutory consultees, the scope of assessment and methodology was agreed.

Impacts Assessed in Full

- 6.17 The following effects have been assessed in full:
- direct effects on all heritage assets within the Inner Study Area, defined as land within the boundary of the proposed development;
 - effects on the setting of designated heritage assets and selected non-designated heritage assets of national importance within the Inner and Outer Study Areas (latter defined as land within 5km of the proposed locations of the wind turbines) where these are likely to have visibility of the proposed development as identified through the Zone of Theoretical Visibility (ZTV) and agreed through consultation with HES;
 - effects on the setting of selected designated assets of national importance outwith the Outer Study Area where long distance views towards the turbines may form part of the setting which contributes to the asset's cultural significance as identified through the ZTV and specifically requested by HES through consultation.

Effects Scoped Out

- 6.18 The following have been scoped out:
- Effects on World Heritage Sites, inventoried Battlefields, Conservation Areas, or Historic Marine Protected Areas as none are present within the Outer Study Area.
 - Effects on the setting of heritage assets more than 5km from the proposed development where no long distance views towards the turbines may form part of the setting which contributes to the asset's cultural significance as identified through the ZTV and have not been specifically requested through consultation by HES.
 - Effects on the setting of heritage assets within the study area, where the asset and the proposed development are not intervisible, and where there is no identified viewpoint of the heritage assets which contributes to understanding, appreciation and significance of the asset within the ZTV.
 - Cumulative effects associated with construction as direct construction effects are limited to the site itself.

Assessment Methodology

Consultation

- 6.19 In undertaking the assessment, consideration has been given to the scoping responses and other consultation undertaken as detailed in Table 6.1 below.

² Scottish Natural Heritage (SNH) changed its name to NatureScot at the end of August 2020; due to the timescales in which the Cairn Duhie EIA Report was drafted, these terms are used interchangeably within this chapter

Table 6.1: Consultation Responses

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action
Historic Environment Scotland (HES)	Pre-application Response (11/12/2018)	<p>HES confirmed that there were no assets within their remit inside the Site boundary. HES recommend that work is carried out to identify if there is the potential for the increased height of the turbines to have impacts on the setting of historic environment assets which were identified for assessment in the consented scheme or on assets which were previously outside the ZTV. Assets within HES's remit which they consider should be assessed for potential impacts include (but are not limited to):</p> <ul style="list-style-type: none"> Lochindorb Castle (SM 1231) Levrattich, cairn 340m W of (SM 90020) Aitnoch, cairn, hut circle & field system 1400m SSE of (SM 4362) Dunearn, fort 510m S of (SM 2470) Ardclach Bell Tower (LB 551) Glenferness House (LB 560) Dunphail House (LB 2171) Darnaway Castle (LB 2283) Relugas (GDL 00325) Darnaway Castle (GDL 00133) <p>HES highlight that setting impacts can occur in key views of heritage assets, where the asset itself falls outwith the ZTV of the proposed development.</p>	Where appropriate each asset has been assessed for impacts upon setting. All assets identified by HES are considered in the assessment.
HES	Scoping Response (26/03/2020)	<p>HES highlight that the search radius should not be limited to 5km but based on the analysis of the ZTV. HES identified significant effects from the Consented Development on two nationally important heritage assets:</p>	This has been addressed in appropriate asset assessments.

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action
		<ul style="list-style-type: none"> Lochindorb Castle (Scheduled monument, SM1231); and Ardclach Bell Tower (Category A listed building, LB551). <p>The previous assets addressed should be assessed.</p>	
The Highland Council (THC)	Scoping Response (31/03/2020)	<p>THC note that:</p> <ul style="list-style-type: none"> Indirect effects on non-designated assets must not be scoped out. They should be considered within the assessment; and In general, assets that do not lie within the ZTV can be scoped out. However, if the asset will be impacted, then consideration must be given to the amenity value of this and considered where appropriate. 	This has been assessed in the chapter.
Aberdeenshire Council Archaeology Service on behalf of Moray Council	Scoping Response (08/05/2020)	<p>Recommend that data should be requested direct from the relevant local authority HER(s) to ensure it is up to date. Confirmed that the outlined methodology is appropriate. An updated study is necessary as the data used in the 2015 assessment will now be out of date. Revised historic environment data should be sought from all relevant sources, including HES, THC and Moray Council. Further consultation with the Moray Council Archaeology service is welcomed. Given the alteration to turbine height, there may be potential cumulative impacts upon the historic environment given the number of existing wind turbine developments within the area.</p>	All are noted in the chapter.
East Nairnshire Community Council	Scoping Response (17/03/2020)	Concern raised over Category B Listed Buildings of the village Ferness, known locally as	This is included in the assessment.

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action
		Glenferness which should be assessed.	
HES	Consultation (20/04/2020)	SLR consulted with HES in relation to site access due to the Covid-19 pandemic.	HES appreciated the situation and advised that if assessments can be carried out remotely they would accept this providing referencing to sources is provided. As noted below, surveys were eventually carried out within the Outer Study Area. (Response received: 23/04/2020)
HES	Consultation (09/07/2020)	SLR requested alteration to the visualisation of Lochindorb Castle (SM1231) requested by HES from a Photomontage to Wireline.	HES agreed to the change, (Response received: 09/07/2020).

Baseline Characterisation

Study Areas

- 6.20 This assessment uses the following study areas for the proposed developments as detailed above:
- **Inner Study Area:** land within the boundary of the proposed development;
 - **Outer Study Area:** land within 5km of the proposed locations of the wind turbines.
- 6.21 Data for the historic environment of the Inner Study Area and land within 2km of it is presented to inform a predictive model for potential buried archaeological remains to exist, but not previously identified, which might be directly affected by construction within the Inner Study Area³.
- 6.22 The Outer Study Area is used to take account of possible indirect impacts on heritage assets of regional and national importance due to effects on their setting. All designated heritage and non-designated heritage assets of regional or national importance within the Outer Study Area have been considered and assessed with reference to potential indirect impacts. Assets that fall outside the ZTV and have no intervisibility have been scoped out of further assessment.

Desk Study

- 6.23 The baseline conditions have been characterised from the following sources:
- data held on non-designated sites in the THC HER;

- data held on non-designated sites in Moray Council, held by Aberdeenshire Council Archaeology Service (ACAS);
- data held on non-designated sites in the National Record of the Historic Environment (NRHE, 'Canmore');
- historic mapping on-line at the National Library of Scotland;
- aerial imagery held by the National Collection of Aerial Photography (NCAP) and HES;
- data of the Historic Land-use Assessment, produced by HES;
- schedules, listings and inventories of designated assets held by HES; and
- relevant published archaeological and historical works.

Field Survey

- 6.24 No field survey for the Inner Study Area was undertaken due to the comprehensive surveys undertaken in 2004 by Kirkdale Archaeology, and again in 2012 by CFA Archaeology Ltd. Site visits to selected heritage assets in the Outer Study Area were undertaken between the 8th and 9th of September 2020 to assess the character and the contribution that the settings of heritage assets make to the heritage significance of the assets. The outcomes of the site visits are described in the relevant sections for each of the visited assets. Only those heritage assets where a visit was considered necessary for assessment of indirect impacts, were visited.

Assessing Significance

Heritage Significance

- 6.25 The heritage significance⁴ of potential heritage assets has been assessed using professional judgement, with reference to Table 6.2 which has been devised by SLR, with reference to HES Guidance (2016b, 2016c, 2016d). It shows the potential levels of heritage significance of an asset related to designation status and grading, and, where non-designated, to a scale of highest to negligible importance. This table acts as an aid to consistency in the exercise of professional judgment and provides a degree of transparency for others in evaluating the conclusions reached by this assessment.

Table 6.2: Heritage significance of heritage assets

Heritage significance	Explanation
Highest	Sites of national or international importance, including: World Heritage Sites; Scheduled Monuments; Category A Listed Buildings; Gardens and Designed Landscapes included on the national inventory; Inventoried Battlefields; and Non-designated assets of equivalent significance.
High	Site of regional importance, including:

³ Data gathered within the 2km zone is not considered for the potential for direct effects but is used to inform a predictability model to inform the likelihood that previously unidentified remains exist within the site.

⁴ Heritage significance refers to sensitivity of the asset.

Heritage significance	Explanation
	Category B Listed Buildings; Some Conservation Areas; and Non-designated assets of equivalent significance.
Medium	Sites of local importance, including: Category C Listed Buildings; Some Conservation Areas; and Non-designated assets of equivalent significance.
Low	Sites of minor importance or with little of the asset remaining to justify a higher importance.
Negligible	Negligible or no heritage significance.
Unknown	Further information is required to assess the significance of these assets.

Contribution of Setting to Heritage Significance

- 6.26 Setting is “the way the surroundings of a historic asset or place contribute to how it is understood, appreciated and experienced” (HES Managing Change: Setting 2016).
- 6.27 The setting of each heritage asset or heritage asset group is described, considering aspects such as location and orientation of the heritage asset, obvious views or vistas, both towards and from an asset, additional screening through small scale topographic variation and vegetation, how much change to the historic setting has occurred, integrity of the setting, topography, land use (including currently operational wind farms near-by and modern intrusive conifer plantations) and intervisibility to other contemporaneous and related heritage assets. All these aspects are considered in relation to how they affect the understanding, appreciation and experience of the heritage asset.
- 6.28 Once the setting of each heritage asset or heritage asset group has been defined and assessed, the ways the setting contributes to their heritage significance, and to what degree, are identified. This is not quantified on a scale but has been used to assist the assessment of the magnitude of impact.

Magnitude of Impact

- 6.29 Determining the magnitude of any likely impacts requires consideration of the nature of activities proposed during the construction and operation of the proposed development.
- 6.30 The changes could potentially include direct (physical) impact (e.g. ground disturbance), and indirect impact (the latter could include visual change, noise, vibration, traffic movements). Impacts may be beneficial or adverse, and may be short term, long term or permanent. Magnitude of impact has been assessed with reference to the criteria set out in Table 6.3.

Table 6.3: Magnitude of impacts on heritage assets

Magnitude of impact	Explanatory criteria
High Beneficial	The proposed development would considerably enhance the heritage significance of the affected asset, or the ability to understand, appreciate and experience it.
Medium Beneficial	The proposed development would enhance to a clearly discernible extent the heritage significance of the affected asset, or the ability to understand, appreciate and experience it.
Low Beneficial	The proposed development would enhance to a minor extent the heritage significance of the affected asset, or the ability understand, appreciate and experience it.
Very Low Beneficial	The proposed development would enhance to a very minor extent the heritage significance of the affected asset, or the ability understand, appreciate and experience it.
Neutral/None	The proposed development would not affect, or would have harmful and enhancing effects of equal magnitude on the heritage significance of the affected asset, or the ability understand, appreciate and experience it.
Very Low Adverse	The proposed development would erode to a very minor extent the heritage significance of the affected asset, or the ability understand, appreciate and experience it.
Low Adverse	The proposed development would erode to a minor extent the heritage significance of the affected asset, or the ability understand, appreciate and experience it.
Medium Adverse	The proposed development would erode to a clearly discernible extent the heritage significance of the affected asset, or the ability to understand, appreciate and experience it.
High Adverse	The proposed development would considerably erode the heritage significance of the affected asset, or the ability to understand, appreciate and experience it.

Significance of Effect

- 6.31 The significance criteria are presented in Table 6.4. Table 6.5 provides a matrix that relates the heritage significance of the asset to the magnitude of impact on its significance (incorporating contribution from setting where relevant), to establish the likely overall significance of effect. This assessment is undertaken separately for direct effects and indirect effects, the latter being principally concerned with effects through development within the setting of heritage assets. Those assets which the matrix scores as major would be considered as receiving a significant effect.

Table 6.4: Significance Criteria

Significance	Description
Major	Severe harm or enhancement such as total loss of significance or integrity of the setting, or exceptional improvement by the development on the heritage significance of the asset and the ability to understand, appreciate and experience the asset in its setting.

Significance	Description
Moderate	Harm or enhancement such as the introduction or removal to the baseline of an element that would affect to a clearly discernible extent the heritage significance of the asset and the ability to understand, appreciate and experience it in its setting.
Minor	To a minor extent the proposed development would introduce change to the baseline that would harm or enhance the heritage significance of the asset and the ability to understand, appreciate and experience it in its setting.
Very Minor	To a barely discernible extent the proposed development would introduce change from the baseline that would harm or enhance the heritage significance of the asset and the ability to understand, appreciate and experience it in its setting.
Negligible	The proposed development would not affect, or would have harmful and enhancing effects of equal magnitude, on the heritage significance of the affected asset and the ability to understand, appreciate and experience it in its setting.
Neutral/ Nil	The proposed development have would no effect on the heritage significance of the affected asset and the ability to understand, appreciate and experience it in its setting.

Table 6.5: Significance of effects on heritage assets

Magnitude of Impact	Heritage Significance (excluding negligible and unknown)			
	Highest	High	Medium	Low
High beneficial	Major	Major	Moderate	Minor
Medium beneficial	Major	Moderate	Minor	Very Minor
Low beneficial	Moderate	Minor	Very Minor	Very Minor
Very low beneficial	Minor	Very Minor	Negligible	Negligible
Neutral/None	Neutral/Nil	Neutral/Nil	Neutral/Nil	Neutral/Nil
Very low adverse	Minor	Very Minor	Negligible	Negligible
Low adverse	Moderate	Minor	Very Minor	Very Minor
Medium adverse	Major	Moderate	Minor	Very Minor
High adverse	Major	Major	Moderate	Minor

Assessment Limitations

- 6.32 Covid-19 resulted in the restriction of travel due to an international pandemic. Online resources such as GoogleEarth™, National Library of Scotland and Aerial Imagery was used as well as the Autodesk Terrain 5 DTM Model of Infraworks to inform indirect impact assessments. When travel restrictions were eased, the setting assessments were carried out on all publicly accessible heritage assets. For assets such as Dunearn Fort (**SM2470**) and Aitnoch Cairn

(**SM4362**) which were inaccessible due to Covid-19 restrictions, an assessment was carried out from the closest accessible point and the above methods.

Baseline Conditions

Introduction

- 6.33 A full description of the proposed development and environs is given in Chapter 1: Introduction, Chapter 3: Design Evolution and Alternatives and Chapter 4: Development Description. The current landscape character of the proposed development and its immediate vicinity consists of moorland. The A939 lies immediately to the west of the proposed development. Adjacent areas of the proposed development are occupied by moorland or conifer plantation, with smaller areas of agricultural fields. Small lochs or lochans are to the south and south-east, with the Dorback Burn to the east of the proposed development.

Designated Heritage Assets

- 6.34 There are no designated heritage assets within the Inner Study area.
- 6.35 Within the Outer Study Area, there are four scheduled monuments, six category A listed buildings and one Garden and Designed Landscape of national importance, listed in Table 6.6. In response to consultation with HES, designated heritage assets in the proximity of the Outer Study Area and up to 10km from the proposed turbine locations have also been considered for assessment, where location and nature of the assets indicates that long distance views may contribute to the heritage significance of the monument, these are shown in Table 6.7. Assets that have been considered in correspondence with HES are outlined in Consultation in Table 6.1.

Table 6.6: Designated Heritage Assets within the Outer Study Area

Name	Type	Index number	Distance to the nearest turbine	Within ZTV
Ardclach Bell Tower	Category A Listed Building	LB551	2.4	Yes
Logie Bridge Ferness (Over River Findhorn)	Category A Listed Building	LB564	2.7	Yes
Aitnoch, cairn, Hut circle and field system. 1400 SSE of	Scheduled Monument	SM4362	3.2	Yes
Burnside, Bridge 300m SW of	Scheduled Monument	SM11832	3.5	Yes
Princess Stone, cross slab 250m SSW of Glenferness House	Scheduled Monument	SM1233	3.6	Yes
Dunearn fort 510m S of	Scheduled Monument	SM2470	4.3	Yes
Relugas	Inventoried Garden and Design Landscapes	GDL00325	4.8	Yes

Name	Type	Index number	Distance to the nearest turbine	Within ZTV
Dulsie Bridge (Over River Findhorn)*	Category A Listed Building	LB557	3.4	No
Glenferness House*	Category A Listed Building	LB560	4.3	No
Dunphail House*	Category A Listed Building	LB2171	4.8	No
Edinkillie house (Former Edinkillie Church of Scotland Manse)*	Category A Listed Building	LB2188	4.7	No
Glenferness Village	Category B Listed Building	LB5103	1.5	Yes

* Denotes assets that were requested by HES but do not fall within the ZTV and have been scoped out from further assessment

Table 6.7: Additional Assets requested by Statutory Consultees

Name	Type	Index number	Distance to the nearest turbine	Within ZTV
Lochindorb Castle	Scheduled Monument	SM1231	5.4	Yes
Darnaway Castle	Category A Listed Building/ Inventoried Garden and Designed Landscape	LB2283 /GDL00133	9.72	Yes

Known Heritage Assets within the Inner Study Area and 2km Buffer

6.36 The location of the designated heritage assets are provided in Figure 6.2. Known undesignated sites are detailed in Figure 6.1 and these include a 2km buffer zone around the Inner Study Area so that the type and density of archaeological remains within the immediate vicinity of the site can be used to inform a predictive model of what further, as yet unidentified, buried remains might exist within the site boundary.

Prehistoric Periods

6.37 There are two possible prehistoric sites within the Inner Study Area. As part of a walkover survey carried out by Kirkdale Archaeology in 2004, two possible hut circles were identified (SLR10 and 11). At the time of CFA's walkover survey in 2012, there was no evidence of the hut circles, potentially obscured due to the high level of vegetation. Kirkdale's walkover however secured accurate locations for the potential site, described as being situated on a natural scarp with potentially contemporaneous clearance cairns to the west from the clearing of land for agriculture.

6.38 Within the 2km search area, there are a further two prehistoric sites. A cairn (SLR30), potentially prehistoric in date, is located 690m to the south-west of the proposed development. To the south-east, there are HER records for the findspot of a Bronze Age axe head (SLR107), 1.35km from the Inner Study Area.

Roman and Medieval Periods

6.39 There are no known Roman or medieval assets within the Inner Study Area.

6.40 Within the 2km buffer zone there are two sites to the north-west of the proposed development which date from the medieval period. The site of the chapel of Dalnahiglish (SLR89), a pre-reformation chapel for the town of Ferness, is located 500m to the west of the Inner Study Area.

Post-Medieval

6.41 Within the Inner Study Area, 25 sites of the post-medieval period are recorded. Botnamain, (SLR4) lies to the north-west of the proposed development and comprises a former post medieval farmstead and associated field system. Three buildings, a trackway and an area of enclosed land are identified on the 1st edition Ordnance Survey (OS) maps of 1874. The site was visited as part of the 2012 walkover survey, during which two buildings were identified with remains of the third potentially obscured by vegetation. A square structure, also identified during the walkover, was located to the edge of the field systems, thought to be a kiln.

6.42 A second farmstead located within the Inner Study Area, by the name of Lynemor (SLR1, SLR8, SLR18), is first marked upon on Roy's Military Survey of 1747 - 55⁵. Five buildings are depicted, located in the north of the Inner Study Area. The farmstead is also shown on the 1st Edition OS map (1874) as a single unroofed building. The walkover of 2012 identified the remains of three buildings and a possible enclosure.

6.43 CFA Archaeology's walkover survey of 2012 identified five heritage assets, and although not recorded in the HER or cartographically sourced, these sites can be reasonably interpreted to be of the post-medieval period. They include: two clearance cairns identified to the south-east of the proposed development (SLR 13, 17), an agricultural enclosure to the north-east of the proposed development area, (SLR 110), (SLR14) a rectangular building and two potential Shielings (SLR112) that lie to the west of the summit of Cairn Duhie.

6.44 The walkover also identified 62 grouse butts (SLR 7) within the Inner Study Area. During the consultation for the 2013 EIA, the group Save our Dava identified that a proportion of these grouse butts may be WWII Military training trenches. The Highland Council Environment Team (THCET) agreed that this is a potential interpretation and asset SLR No. 7 may date from the 20th Century (see Appendix 6.1).

⁵ Roy, W. (1747-55) Military Survey of Scotland

20th Century (Modern)

- 6.45 Apart from the possible WWII origin for some of the ‘grouse butts’ there are no modern features within the Inner Study Area. Within the 2km buffer zone there is one modern asset, a royal Observer Corps (ROC) observation post (SLR25) which lies 640m to the north west of the Inner Study Area.

Undated Assets

- 6.46 Within the Inner Study Area, there is an undated Cairn (SLR5), potentially a walkers’ cairn situated to the south-east of the summit of Cairn Duhie. Within the 2km buffer zone, there are 87 undated sites which are listed in Appendix 6.1. These include 12 farmsteads, 11 Houses, 2 Townships, 6 Cairns, 3 Burial Mounds, 6 Roads and Bridges.

Historic Mapping

- 6.47 A review of online historic mapping available from the National Map Library of Scotland was undertaken. The earliest map of a sufficiently large scale of the area of the proposed development is Roy’s Military Survey of Scotland (Roy 1747 - 1755). The majority of the Inner Study Area is depicted with hills, labelled as ‘Carndui’, with a settlement of six buildings with associated enclosures under the name Lynemor (SLR No 1) to the north-east within the site boundary. Carndui and Lynemor are later depicted on the 1807 map of Arron Arrowsmith. By the time of the 1843 1st edition OS map, Lynemor appears to have been deserted and is not shown. The place name of Carndui has transcribed as ‘Carn Dubhaidh’, which translates to English as Black Cairn. A settlement of the name of Botnamain is shown to the north-west of Cairn Duhie within the site boundary, also depicted on the 1894 OS map. Cairn Duhie is still labelled ‘Carn Dubhaidh’, and by the 1906 OS map, the boundary markers for Moray and Highland Council are marked. It also records a land boundary running south-east from Botnamain farmstead (SLR 4), with trackways and an enclosure to the north-east of the farm. Upon the 1955 OS map, only the council boundary between Moray and Highland is depicted within the Study Area.

Aerial Photography

- 6.48 Aerial imagery available from the National Collection of Aerial Photography (NCAP) and Canmore was reviewed. There was no oblique aerial imagery of the Inner Study Area available from Canmore.
- 6.49 NCAP hold seven vertical images of three sorties flown on the 26th of August 1946 (106G/Scot/UK/0169), 14th of May 1988 (ASS/61188) and 16th of June 1996 (AF/96/0037) covering the Inner Study Area. The vertical images held by NCAP proved too small a scale to be useful to the assessment, and no new sites were identified from them.

Discussion

- 6.50 Earlier prehistoric activity is scarce in the area, although within the Inner Study Area settlement activity is suggested by the presence of two possible hut circles (SLR No 131, 129).

In the Outer Study Area there is a prehistoric cairn to the south-west (SLR16) of the site boundary.

- 6.51 There are no sites of ‘Roman’ origin within the environs of the proposed development. This is unsurprising, giving its location in relation to Hadrian’s Wall and the Antonine Wall which mark the two northern frontiers of Roman Britain during much of this period, lying over 150km away.
- 6.52 The presence of a pre-reformation church (SLR No 89) in the village of Ferness to the north of the Inner Study area provides indication of medieval settlement activity within the 2km buffer zone. Other assets that are classed within this period include the chapel at Dalnahiglish.
- 6.53 Post-medieval activity within the Inner Study Area is associated with agricultural settlement and activity: including farmstead, agricultural buildings, trackways and enclosures boundaries (SLR Nos 1-22, 110-114). Other recreational activity is evidenced by a number of Grouse Butts (SLR No 7).
- 6.54 There is no 20th century or modern evidence within the Inner Study Area, although the grouse butts are still in use today, as per Save our Dava comments on the previous application where it was indicated these grouse butts may be World War Two practice trenches. THCET agreed that this may be a possible interpretation of the heritage assets. Modern features within the 2km buffer zone include a ROC Observation post that indicates military use in the area.

Predictive Modelling: Potential for Unknown Heritage Assets within the Inner Study Area

- 6.55 The potential for unknown remains of the prehistoric period is low to moderate. Much of the lower ground in the north of the proposed development has been significantly affected by forestry and agriculture. There is moderate potential in the land in proximity to SLR 129 and 131, to the south of the Inner Study Area, and low potential in the remainder of the site.
- 6.56 The potential for unknown remains of the Roman Period is very low, as the site is located to the north of the Roman frontiers of Britain.
- 6.57 The potential for medieval remains is low. There is no evidence for medieval heritage assets within the Inner Study Area, or the 2km buffer zone.
- 6.58 The potential for unknown remains of the post-medieval period is high near the remains of Botnamain and Lynemor and their associated features, and moderate across the remainder of the proposed site. Any features located are likely to be associated with the post-medieval agricultural landscape or recreational land use, and as such would be of local importance.

Future Baseline

- 6.59 If the proposed development was not to proceed, there would likely be no change to the baseline condition of the various heritage assets and features that presently survive within the site.

Implications of Climate Change

- 6.60 As per *A Guide to Climate Change Impacts On Scotland's Historic Environment* (October 2019), peat is classed as a cultural heritage resource due to its formation during the Bronze Age as mass deforestation occurred. Due to the anaerobic conditions under which peat is formed, it is often seen as a 'window' into previous environmental conditions of the past. The presence of peat across site as detailed in Chapter 9: Hydrology, Hydrogeology, Geology and Peat, means there is a potential for the preservation of environmental or organic deposits to survive. Climate change through rising temperatures could affect naturally formed peat deposits leading to the destruction of paleoenvironmental evidence which are known to include archaeological remains that would not survive outside such preservation conditions. This would result in the loss of previously unrecorded cultural heritage.
- 6.61 Other impacts of climate change on buried remains can be indicated through extreme weather conditions having the effect of increased rainfall and fluctuating temperatures resulting in more frequent wetting and drying cycles thus changing the potential preservation conditions that buried artefacts may lie within. This has the potential to damage or lose organic artefacts as a result. For upstanding remains this has the potential to cause water penetration causing erosion and the historic fabric to decay at a more rapid rate.
- 6.62 Notwithstanding the above, it is considered that the description of the baseline conditions remains robust and allows for an assessment of the impacts of the proposed development, during its lifespan, on cultural heritage.

Cairn Duhie Wind Farm Design Considerations

- 6.63 The layout of the proposed development took into account the location of assets to avoid direct effects on these by applying a 10m buffer around known HER monuments. Where it has not been possible to avoid direct effects on assets within the Inner Study Area, additional mitigation measures are set out below.

Likely Significant Effects

Embedded Mitigation Measures

- 6.64 Mitigation in relation to most heritage assets has been embedded into the design of the proposed development infrastructure and has therefore avoided or reduced the risk of direct impacts wherever possible.

Construction Effects

Predicted Construction Effects

- 6.65 Figure 6.1 shows there will be direct impacts upon **SLR7**, a series of grouse butts that have the potential to be Second World War trenches. They have the potential to be affected by an access track to the north and Turbine 2. The potential trenches are of local heritage

significance and the magnitude of effect would be low adverse resulting in an effect of Very Minor significance.

- 6.66 Figure 6.1 also indicates that the trackway (**SLR111**) would be directly affected by the installation of Turbine 6 and an access track. The historic trackway would be cut at multiple points although most areas would survive, creating an opportunity to acquire an insight into the composition of the trackway. The heritage significance of the trackway is negligible and the magnitude of impact would be very low, resulting in an effect of negligible significance.

Proposed Mitigation

- 6.67 No significant effects are predicted, however the following mitigation will be put in place during construction:
- Fencing off and avoidance of known heritage assets in close proximity to the proposed development that could otherwise be accidentally damaged during the construction works.
 - A watching brief on elements of the ground works that have the potential to have direct impacts on **SLR111** as well as unrecorded buried archaeology.
 - A watching brief or archaeological trial trenching over **SLR7**, where the potential Second World War trenches to the north may be affected.
- 6.68 The precise scope of the mitigation works would be negotiated with THC and the agreed mitigation programme would be documented in an agreed Written Scheme of Investigation.

Residual Construction Effects

- 6.69 The completion of the archaeological mitigation programme outlined above will minimise the loss of the cultural heritage resource that could occur as a result of the construction of the proposed development. Any harm caused to buried remains would be balanced by the gain in knowledge resulting from investigation and reporting. Taking mitigation into account the residual effects of the proposed development upon the grouse butts / WWII trenches (**SLR7**) and trackway (**SLR111**) are negligible.

Operational Effects

Predicted Operational Effects

- 6.70 The ZTV in Figure 6.2 illustrates where there would be theoretical visibility of the proposed development from designated heritage assets within the Outer Study Area. This has been used to filter out assets which do not require further assessment as they fall outside the ZTV, and to inform the impact assessments on others as outlined below.
- 6.71 The following assets have been scoped out of further assessment due to falling outwith the ZTV:
- Dunphail House (**LB 2171**)
 - Edinkillie House (**LB2188**)
 - Glenferness House (**LB 560**)

- Dulsie Bridge (LB557)

- 6.72 There are eight heritage assets which fall within the ZTV, all located within the Outer Study Area, which are assessed in detailed below. These include five scheduled monuments (Table 6.6; Figure 6.2) including: two prehistoric monuments, Aitnoch Cairn (SM4362) and Levrattich Cairn (SM1738); two Iron Age sites, the hillfort of Dunearn (SM2470) and the Princess Stone (SM1233); and the post-medieval asset of Burnside Bridge (SM1832). As scheduled monuments, each asset is of the highest heritage significance.
- 6.73 They also include: one Category A Listed Building, Ardclach Bell Tower (LB551); one Inventoried Garden and Designed Landscape, Regulus Designed Landscape (GDL00325); and a Category B Listed Building of Glenferness (LB5103), comprising four buildings under one entry. The Category A Listed Building and Inventoried Garden and Designed Landscape are of the highest heritage significance. The Category B Listed Building is of high heritage significance.
- 6.74 During consultation, HES requested that the assets of Lochindorb Castle (SM1231) and Darnaway Castle (LB2283/GDL0013), beyond the Outer Study Area, be included in this assessment. These assets are of the highest heritage significance.

Lochindorb Castle (SM 1231)

- 6.75 Lochindorb Castle dates to the 13th Century and was destroyed in 1458. It is situated in the Loch of Lochindorb. The castle sits on an artificial deposit which predates the castle, potentially for an earlier structure. The castle was first recorded in the Wars of Independence when it was occupied by Edward I. The castle is situated in a valley surrounded by hills that would have been covered in woodland along an important trade route along the valley of Lochindorb between Strathspey and the Moray Firth.
- 6.76 With the castle being situated on an island, and no evidence of a causeway, the castle occupies a defensive position within the loch. Its location allowed control of the valley and the route north and south. Along the minor road, there is greater visibility of the castle in the approach to the loch from the south in comparison to the north.
- 6.77 The current setting of the castle and loch is within a valley with bare slopes and upland moorland. The modern unnamed minor road to the east of the loch has its origins in antiquity. The loch side has a number of post-medieval buildings, including Lochindorb Lodge which lies 900m to the south of the castle. Lying 1km to the east of the castle there is modern conifer plantation. The asset lies 2km to the east of B9007, a General Wade military road that is now a main access route from the south. The asset also lies 3km to the west of the A939, a main road that has been used since it was a military road similar to that of the B9007. The wind farm of Berry Burn lies 13km to the north east of Lohindorb Castle, with 11 turbines visible (Plate 6.1).



Plate 6.1: View of Lochindorb Castle from an Unnamed road to the South.

- 6.78 The castle lies approximately 5.5km from the closest turbine (Turbine 2). Theoretically the ZTV indicates that three turbines of the proposed development would be visible from the castle, and five blade tips from the roadside where the monument is appreciated, (Figure 6.2). From the minor road that runs adjacent to the loch from a position lying to the south-east of the castle (Figure 6.2) the view would encompass both the castle and the proposed development.
- 6.79 The greatest impacts upon the appreciation and the understanding of the castle within its setting would be from the roadside to the south. The existing turbines of Berry Burn combined with the proposed development, however, would not cause the views towards the monument to be unduly crowded by the turbines of the two wind farms in the background. The five theoretically visible blade tips would form a minor aspect of the landscape and would not impact upon the ability to understanding or appreciate the monument. The monument is of the highest heritage significance. The magnitude of impact upon its setting would be None, the significance of effect is Nil.
- #### *Levrattich, cairn (SM 90020)*
- 6.80 The monument comprises a turf covered prehistoric burial cairn, potentially dating from the Late Neolithic to the Early Bronze Age. The cairn has a circumference of 14.5m and is 1m in height. It lies 340m west above Levrattich farm upon the shoulder of the valley of the River Findhorn. Its prominent position at approximately 200m AOD overlooks the gentle slopes of the valley of the River Findhorn to the east as well as Loch Belivat and unnamed lochans 1.4km to the north-east. Its location would have been chosen to provide good visibility from an approach to the cairn from the valley as well as visibility of the valley from the cairn.
- 6.81 The current setting of the cairn is within a pastoral field lying to the immediate west of the C173 minor road. Overhead electricity pylons run perpendicular to the minor road 85m to the

south-west of the cairn (Plate 6.2). The farm buildings of Levrattich and Ardclach, at a distance of 800m, are to the east and south-east. Surrounding the monument are agricultural fields, historical plantations and deciduous woodland. Plantation and riverine trees are also located along the River Findhorn. The current treescape obscures much of the view of the valley to the east. Hill of Glashkyle Wind Farm is situated to the east (9.5km) and appears in the distant landscape.



Plate 6.2: View of Cairn Duhie from Levrattich (SM90020)

6.82 The closest turbine (Turbine 19) is 3.4km to the south-east of the monument. Theoretically, all 16 turbines of the proposed development would be visible from the monument, of which seven would be blade tips only. The proposed development would appear in views to the south-east in the periphery and as part of the backdrop to views of the valley of the River Findhorn. The monument is of the highest heritage significance, there would be a very low adverse magnitude of impact upon the ability to understand and appreciate the heritage asset, and the significance of effect would be Minor.

Aitnoch, cairn, (SM 4362)

6.83 Situated on the gentle south-east-facing slope of the Hill of Aitnoch is a circular stone-walled hut visible as a raised platform about 8m in diameter. There are traces of walling around the north-eastern arc. The entrance is not evident. The hut occurs near the south-east edge of a small contemporary field system marked by stone clearance mounds and a few lynchets, with fields averaging about 20m by 10m. Inconspicuously placed amongst the clearance cairns is a contemporary cairn with a kerb of contiguous stones, visible intermittently around the perimeter. It measures 8m in diameter and is 0.5m high. The centre has been robbed of stone, but not significantly enough to disturb the burial.

6.84 The cairn sits on a rise above the Dorback Burn, which discharges into the Loch of Lochidorb, with views facing the loch. The cairn faces to the south, observing the junction between three valleys. To the east of the asset, the cairn overlooks the valley that lies between Craig Tiribeg and Carn a' Cheatrainh Mhoir, the valley which the Dorback Burn runs through. The cairn also overlooks the valleys to the south of Craig Tiribeg and Carn na Glaisneach from which the Anaboard Burn runs. The cairn overlooks the confluence of the Anaboard Burn and the Dorback Burn 1.6km to the north-east.

6.85 A minor unnamed road runs east to west from 400m to the south of the monument linking to the A939. The cairn lies 1km to the south-west of the A939 a major link road to the north of Granton on Spey. Modern conifer plantation that lies on the west of the A939 can be seen from the monument. The ZTV of the proposed development predicts that 12 blade tips would be theoretically visible on the north-western side of the scheduled area, with the easterly side of the monument falling outwith the ZTV. The closest turbine lies 3.5km to the north of the cairn (Turbine 2) (See Figure 6.2 and Figure 6.4).

6.86 With the cairn's primary focus being to the Dorback Burn to the south and focusing on the route through the valley to the east and west, it is assessed that the proposed development would occupy peripheral views from the monument. The cairn is of the highest heritage significance, and the magnitude of impact on the heritage significance of the monument from the Proposed development will be very low adverse with the significance of effect being Minor.

Dunearn, fort (SM 2470)

6.87 Dunearn, a fort, occupies an S-shaped summit of a wooded hill named Doune. It measures about 245m north-east to south-west by a maximum of 45m transversely, within two ruinous, turf-covered walls. The inner wall conforms to the summit of the hill and is spread to about 4m. The outer wall, visible as a stony scarp averaging some 3.5m wide, is separated from inner wall by a terrace. The main entrance was probably in the south where there is a gap in the walls at the head of an ill-defined track which leads obliquely up slope from the south-west. This track is possibly an original approach but has undoubtedly been used for access to cultivate the interior of the fort which was ploughed until 1906. Down the slope to the south of this entrance, the hillside appears to have been scarped in two places for distances of about 70m, and around the west slopes are traces of a terrace. These may be remnants of outworks defending the more vulnerable slopes (Plate 6.3).



Plate 6.3: Dunearn Fort (SM470)

- 6.88 The fort is situated on the summit of a prominent knoll in the landscape overlooking the River Findhorn. The fort is situated in the valley of Hill of Aitnoch and Carn na Caillich, overlooking the low lying ground to the north, north-east and north-west. The asset overlooks two confluences of watercourses to the south-west and to the east; the confluence of the River of Findhorn and Leonach Burn lies 1km to the west, and south-west, and the confluence of Tomlachlan Burn and an unnamed watercourse is located 1.2km to the east.
- 6.89 The heritage asset is currently shrouded by deciduous forestry. A minor road runs 200m to the north of the heritage asset with telephone poles lining the roadside. The road is noted as an old military road which is depicted on the OS 1st edition 1871 map, General Wade's military road linking to Inverness from the south. At 400m to the north of the monument is the farm Dunearn which is an active farm with associated pastural fields. At 1km from the asset is Burnside Bridge (SM11832) a bridge that was installed in the military campaign of the 18th century in the occupation of Scotland (see below for assessment of effects on the bridge). Hill of Glashkyle Wind Farm is situated 9.6km to the north-east of the asset, Hill of Glashkyle is situated in the distant landscape and would not be an encroaching presence on the asset. The ZTV indicates that 16 of the proposed turbines will be visible from the monument. The closest turbine of the proposed development lies 3.5km to the west-north-west, (Turbine 3) (See Figure 6.5).
- 6.90 The monument's primary focus is on the low lying ground to the north of the monument, with the ZTV indicating that the proposed development would be in the periphery of the original setting of the monument. However, given that the monument is currently surrounded by deciduous forestry which is not conducive to its original setting, the Proposed development would not be visible through the forestry. In spite of this asset being of the highest heritage significance, due to the forestry and other modern intrusions on the landscape in the area

around the fort, the magnitude of impact on the understanding and appreciation of the monument would be very low adverse with the significance of effect being Minor.

Ardclach Bell Tower (LB 551)

- 6.91 Ardclach Bell Tower is situated 900m to the north-west of the village of Ferness, upon a hillock above the River Findhorn, overlooking valleys to the south and north of the river Findhorn, and the valley of the Tomnachan burn to the east. It provides a vantage point from which the surrounding landscape can be viewed. The date upon the tower is 1655, but sources suggest it was built at an earlier but unknown date. It was originally constructed as a watch tower, and Canmore records that the tower formed a combined prison and watchtower during the War of the Three Kingdoms (1639 to 1651).
- 6.92 The tower was built on the estate of Alexander Brodie of Level, a covenanter who fought in the wars between the Covenanters and the Royalists between 1639 to 1651. The Old Parish Church (LB554) lies 300m to the south of the tower, dating from 1626. By 1832 a belfry had been added to the tower to call worshippers to the church from the valley of the River Findhorn.
- 6.93 The current setting of the asset has changed since its construction. Historically the landscape surrounding the watchtower was one of open moorland. Between Roy's map of 1745 and the Ordnance Survey map of 1843 additional conifer plantation was planted along both the south-eastern and northern slopes of the valley of Findhorn. On the Ordnance Survey map of 1905 forestry plantation has expanded to up to the tower obscuring views of the valley of Findhorn and the valley to the north. Additional forestry has been added during the 20th Century. Views that would have been observed by the watchtower are no longer visible due to the forestry. If the forestry were to be felled, it is assumed that it would be replanted resulting in a temporary impact from the development. Should no forestry be replanted, it would open views of the valley below restoring the original setting of the tower, however other modern intrusions would continue to impact upon the monument, including forestry and electricity pylons, 0.3km to the south-east of the tower.
- 6.94 Approaches to the monument are from the south, from the church, and from the west. The final approach to the tower is along a short path to the south of the tower. Along these routes the monument is screened from view by trees until the building is reached. In the final approach to the tower from the south, the proposed turbines would be to the east, in the peripheral view.
- 6.95 The tower is located 2.5km from the closest turbine of the Proposed development (Turbine 14). As per the ZTV (See Figure 6.2) it is predicted that all of the proposed turbines would be visible from the tower. The photomontages presented in **Figures 5A4.28a and 5.2.8e** within Chapter 5: Landscape and Visual Impact Assessment, from Viewpoint 8, demonstrate that in views from the tower towards the Proposed Development, much of the landscape is covered or obscured by dense mixed forestry.
- 6.96 The setting of the asset which contributes to the understanding and appreciation of the monument as a watch tower includes middle distance views along the valley to the north and

south. These valleys are largely screened from view by historical and 20th century plantations, with a line of pylons located to the south. The turbines appear upon the hills in the backdrop to the valley of Findhorn. With regard to the use of the tower as belfry, there is no current visibility between the church and the tower and it is possibly that, due to topography, there was no historical visibility between these two assets.

- 6.97 The Proposed development would not significantly detract from the ability to understand, appreciate or experience the asset as either a watch tower or a belfry. The asset is of the highest heritage significance, the magnitude of impact would be very low adverse, and the significance of effect Minor.

Princess Stone (SM1233)

- 6.98 The Princess Stone is a Pictish Symbol stone, dating to around the 9th century (Fraser, 2008). The stone details zoomorphic interlace, with depictions of zoomorphic animals associated with Pictish symbol stones. In the early 19th century, the stone is thought to have been moved to its current location, and it was likely broken into three segments. It is currently cemented together with the supports of a concrete post on either side. The upper segment of the stone is missing or heavily eroded away.

- 6.99 The stone was originally situated on a deep meander in the River Findhorn before it was moved in the 19th Century, to protect it from flooding. The stone lies on a rise over the same deep meander in the River Findhorn, it is situated in a mix of deciduous and conifer forestry that lines the river. The stone was located low in the valley of the River Findhorn, perhaps for use as a territorial marker. With its location being so low in the valley the setting of the monument is primarily the river and valley of Findhorn.

- 6.100 As noted above, the monument is not in its original setting following its move in the 19th century. It is surrounded by a mix of deciduous and conifer plantation, situated on the Glenferness House (LB650) estate, which lies 200m to the north-east of the stone. The ZTV predicts that only seven blade tips would be theoretically visible from the monument, however, given the surrounding woodland, it is unlikely any turbines would be visible. The stone lies 3km from the closest turbine (Turbine 9).

- 6.101 The Proposed development would create a minor element in the backdrop of the landscape to the east of the monument. Topography surrounding the asset limits visibility of the Proposed Development, as well as the deciduous forestry obscuring views from the asset. The Proposed development would not create an impact that would alter the appreciation or understanding of the monument. Given this, the proposed development would create a neutral magnitude of impact and the effect on the significance of the monument would be Nil.

Burnside Bridge (SM11832)

- 6.102 The monument is a military road bridge, surviving as upstanding structural remains, which once spanned Tomlachlan Burn to the west of Burnside. The bridge was part of a section of the Corgarff to Fort George military road that was built following a recommendation on the

commemoration of the state of the Highlands presented to George I in 1724 by Lord Lovat. Following an inspection of the area by Major-General George Wade later that year, Wade advocated the re-establishment of Highland companies, the construction of a number of forts, and the provision of a boat on Loch Ness. The construction of a network of roads to enable rapid troop movement was an essential concomitant of this proposal.



Plate 6.4: Burnside Bridge with views toward Cairn Duhie.

- 6.103 The immediate setting of the bridge would be the water crossing of Tomlachlan Burn. Its current setting has changed considerably since its installation with the burn changing course and a new bridge being installed with the road that was constructed in 1809. Currently deciduous woodland lies in close proximity to the asset of 6m with Tomlachlan Burn lying 7m from the edge of the scheduled area (Plate 6.4). The area is also surrounded by pastoral fields and their wooden fence lines. Burnside Farm lies 250m to the east of the Bridge with Dunearn Lodge lying, 380m to the south-west.

- 6.104 The ZTV indicates that all 16 blade tips of the Proposed development would be theoretically visible from the bridge, and of these eight would include hubs, with the closest turbine located 1.5km (Turbine 19) east of the asset. The asset is appreciated on the journey westward with the Proposed development in the background of the approach. The setting of the asset is also compromised with the Burn of Tomlachlan no longer running under the bridge thus the historic setting of the monument is void.

- 6.105 Given the change to the bridge's use over time and that it no longer functions as a bridge, it is assessed that the Proposed development would have no impact on the appreciation or understanding of the monument. The magnitude of impact is assessed as none and the significance of effect as Nil.

Logie Bridge (LB564, Category A)

- 6.106 Logie Bridge, referred to as Ferness Bridge in the HER, was built in 1814-17, by engineer Thomas Telford. It comprises a three-arch rubble bridge with segmental arches of unequal size and triangular cutwaters. The bridge was built as a crossing for the River Findhorn, and according to cartographic sources this was the first bridge at this crossing point. The immediate setting of the bridge is the River Findhorn where it was designed to replace the previous crossing.
- 6.107 The current surroundings of the asset are similar to its original setting when established. The bridge is currently used as access over the River Findhorn for the A939. The bridge is surrounded by deciduous woodland that lines the River Findhorn. To the north-west and south-east there are modern traffic light systems over the road accessing the bridge. The ZTV predicts that seven blade tips of the Proposed development would be theoretically visible.
- 6.108 Given the original setting of the site is that of the River Findhorn, the Proposed development would be peripheral to the bridge, with little impact on appreciation and understanding of the monument. Although an asset of the highest heritage significance, based on this analysis, the magnitude of impact is none, with the significance of the effect would be Nil.

Relugas (GDL 00325)

- 6.109 Relugas is one of the finest examples of the 19th century picturesque style of landscape design in Scotland, associated with Thomas Dick Lauder, poet, antiquarian and artist.
- 6.110 As per the Inventoried listing, the designed landscape occupies a site of complex strong relief at the confluence of the Rivers Findhorn and Divie. It comprises hills, rocky knolls and river terraces from which the gorge-like course of the Divie can be appreciated. The 'Doune of Relugas' used to provide a central vantage point from which the core area of the designed landscape used to be viewed but the prolific growth of woodland and shrubs and scrub now limits views over lower ground and the main internal views are obtained from the vicinity of the new Lodge. Relugas is an extensive designed landscape which relies on its naturalistic design and long footpath trails to provide opportunities for picturesque views. Lauder's Plan of Relugas 1830 concentrates on the core area around the mansion house but the examination of the 1st Edition Ordnance Survey map indicates an extensive complex pattern of informal open spaces framed by woodlands. Only the open spaces close to the house are defined as ornamental parkland or gardens on the early maps. These represent the core of a substantial designed landscape which merged with its neighbours at Dunphail and Dounduff. The extent of the designed landscape did not change during the 19th century. Former areas of parkland defined on the 1st Edition O.S. Map have, however, been infilled by forestry during the 20th century.
- 6.111 Relugas is situated 8.5km south-west of Forres in Morayshire, accessed from the B9007. It lies 400m to the west of the A940. The Relugas Estate has dramatically changed since its creation and design in the 19th Century. Most of the plantations have been removed and replaced with agriculture and space for recreational sports with a small cluster of remaining deciduous

forestry. The ZTV predicts that in the southern woodland, 70m to the south of the Mains of Relugas, 16 turbines would be theoretically visible, and of these 14 would include hubs. Where the ZTV predicts that the Proposed development would be visible, an agricultural building has been erected. The original design of the GDL has been changed so intensely since its inception that its setting has already been compromised thereby resulting in little effect from the Proposed Development. The area of which the Proposed development would be visible is not an area of the GDL which, if compromised, would not impact on the appreciation and understanding of the landscape.

- 6.112 As the Proposed development is located to the south of the asset, and the setting of the plantation has been compromised by a modern building, there is limited impact on the understanding and appreciation of the asset. Although the asset is of the highest heritage significance, this assessment concludes that the magnitude of Impact would be negligible resulting in the significance of effect being Nil.

Darnaway Castle (LB 2283, Category A)

- 6.113 Darnaway Castle, the principal residence of the Earls of Moray since the Late Middle Ages, stands upon the site of a castle built by Thomas Randolph, Regent to David II during his minority. In about 1450, the existing ancient hall was constructed, which contains a contemporary open timber roof, one of the very few examples left in Scotland. In 1810, a large new castle was erected in front of the ancient hall, and connected with it, so that the hall forms part of the existing mansion. However, its walls have been greatly altered and all that now remains of the original hall is its timber roof.
- 6.114 The castle is situated within a designed landscaped that was established in 1802 although the castle was not constructed until 1810. The castle is situated at the end of the tree avenue that lies to the west of the main castle entrance. The castle faces to the north-east, overlooking gardens and parkland.
- 6.115 The castle was altered in 1950 with the addition of the kitchen clock tower. The surrounding grounds of the castle have been preserved with many of the tree avenues retained. There is little modern change to the setting of the castle.
- 6.116 The ZTV predicts that 12 blade tips would be visible from Darnaway Castle and no hubs would be visible. Given the approach to the asset is from the west with the approach shrouded in deciduous forestry, the Proposed development would not be visible. Furthermore, the Proposed development lies 11km from the closest turbine (Turbine 15) therefore should the Proposed development be visible it would appear as a minor element in the distant landscape due to the long distance view. Although an asset of the highest heritage significance, the above analysis concludes that, the magnitude of the impact would be none and the significance of effect would be Nil.

Darnaway Castle (GDL 00133)

- 6.117 Darnaway Castle designed landscaped was instated in 1802 by the Earl of Moray. The landscape is composed primarily of parkland and associated trees. The parkland was formally terraced in the late 19th to early 20th Century.
- 6.118 Darnaway Castle is situated above the valley of the River Findhorn, some 8km from the shore of the Moray Firth. The nearest town of Forres lies 4km to the north-east. The River Findhorn forms a physical boundary along the east side of the grounds where it emerges from a deep gorge.
- 6.119 The current setting of the designed landscape has not changed considerably since its inception, apart from the addition of modern farm buildings across the landscape such as Redstone and Whitemire, and the creation of agricultural fields on the parkland in the south. The ZTV predicts that 16 of the turbines blade tips would be theoretically visible in the north of the designed landscape and the south-east, and of these, nine would include hubs, with the closest turbine being 9km away (Turbine 20).
- 6.120 Given the distance from the closest turbine and the modern changes within the landscape, the Proposed development would form a minor element in the distant landscape beyond the designed landscape. The Proposed development would not impact on the understanding or appreciation of the designed landscape due to its distance from the Proposed development (9km to the south which would form a minor element in the distant landscape. Although this asset is of the highest heritage significance, the assessment results in the magnitude of impact equating to none, with the significance of effect as Nil.

Ferness Village (LB5103 Category B)

- 6.121 Ferness Village is comprised of nine Category B, 19th Century cottages, which are assessed as a single asset group. The village was established as the estate cottages for the Glenferness Estate which lies to the south-west of the village formerly known as Fairness. The purpose of the cottages was to provide housing for the workers of the Glenferness Estate. The setting of the village is directed to the estate of Glenferness.
- 6.122 The village of Ferness is situated above the River Findhorn below the summit of Cairn Duhie. It is surrounded by modern conifer plantation creating natural screening. Within the village itself, the road has been updated to modern standards with an overhead telephone cable running north to south in alignment with the village. The ZTV predicts that a total of 11 blade tips will be theoretically visible from the assets. The listed buildings lie 1.5km to the north-west of the Proposed Development's closest turbine (Turbine 19).
- 6.123 The asset group is screened naturally by topography and conifer plantation to the south-east. As the asset group's primary setting is focussed on the village within itself, and due to its history linking the asset to the estate in the south-west, the Proposed development would not impact on the appreciation of the assets. It is assessed that as the assets are of High heritage

significance and the magnitude of impact would be very low adverse, that the significance of effect is Very Minor.

Proposed Mitigation for Indirect Impacts

- 6.124 For assets outside the Inner Study Area the opportunity to mitigate indirect impacts is limited, particularly as the historic landscape over much of the region is relatively open, and most forms of screening, such as tree planting, might also impact negatively on the understanding and appreciation of heritage assets within their setting. As the predicted significance of effect for these impacts is nil to Minor, no additional mitigation is suggested.

Residual Operational Effects

- 6.125 The significance of operational effects through change to the setting for the heritage assets in the study areas are nil to Minor. As noted above, the opportunity to mitigate such impacts is limited therefore no mitigation is proposed. Consequently, the residual effects of the operation of the Proposed development would be as outlined in the assessment above.

Cumulative Effects

- 6.126 Cumulative effects have been considered with regard to any wind farm developments that are:
- consented or in the planning process, either as an original submission or in appeal;
 - within 5km of heritage assets of regional importance; and
 - within 10km for heritage assets of national importance that are predicted to experience an effect that is Minor or above as a result of construction or operation of the Proposed Development.
- 6.127 The Proposed development would not form any significant effects in EIA terms, and would therefore not contribute to any cumulative effects.

Predicted Cumulative Construction Effects

- 6.128 There are no predicted cumulative construction effects on assets within the Proposed development and this has been scoped out of detailed assessment.

Predicted Cumulative Operational Effects

- 6.129 There are no predicted cumulative operational effects on assets within the Proposed development and this has been scoped out of detailed assessment.

Proposed Mitigation for Cumulative Effects

- 6.130 As the magnitude of impact is neutral and the significance of effect is neutral then there is no mitigation required for the cumulative effect.

Residual Cumulative Operational Effects

- 6.131 As there are no cumulative effects there are no residual effects on the asset.

Summary

- 6.132 This assessment has considered data from a diverse range of sources to determine the presence of heritage assets which may be affected by the Proposed Development. The potential direct and indirect effects on the identified assets, mitigation measures for protecting known assets during construction or recording or currently unknown features which could be lost due to groundworks during construction, and the residual effects of the Proposed development have been appropriately assessed in paragraph 6.52.
- 6.133 The Proposed development is on land occupied by moorland or rough grazing. The baseline concluded that there is potential evidence for prehistoric activity within the site, however many of the archaeological remains are found to be associated with post-medieval recreational landscape with large areas occupied by grouse butts used for shooting. There is also evidence of two farmsteads of Botnamain and Lynemore on the site which relate to a previous land use for agricultural purposes.
- 6.134 The proposed development's infrastructure would have direct effects on the grouse butts to the north of the site (SLR7) and (SLR111). A mitigation strategy for the direct effects is set out above.
- 6.135 The assessment has considered the potential indirect impacts on designated heritage assets within the Outer Study Area of the proposed development and has concluded that the impact on the significance of monuments are as follows:
- Minor impact on Arclach Bell Tower (LB551), Dunearn Fort (SM2470) and Aitnoch Cairn (SM4362);
 - a very Minor impact on Ferness Village (LB5103) and Levrattich Cairn (SM11738); and
 - no impact on monuments: Lochindorb Castle (SM1231), Princess Stone (SM1233), Burnside Bridge (SM11832), Logie Bridge (LB564), Relugus (GDL00325) and Darnaway (GDL00133/LB2283).
- 6.136 None of the impacts are considered to be significant in the context of the EIA Regulations.
- 6.137 These are within the lowest level of effects identified within the SNH and HES EIA Handbook 2018. There are no predicted significant effects in EIA terms on heritage assets resulting from the construction or operation of the proposed development. In respect to SPP paragraph 145, the assessment concludes that there would be no EIA significant adverse effect on the integrity of the setting of scheduled monuments.

Table 6.3: Summary of Residual Effects

Asset	Designation	Likely Effect	Mitigation	Means of Implementation	Residual Effect
Dunearn Hill Fort	Scheduled Monument	Minor	N/A	N/A	Minor

Asset	Designation	Likely Effect	Mitigation	Means of Implementation	Residual Effect
Ardclach Bell Tower	Listed Building Category A	Minor	N/A	N/A	Minor
Aitnoch Cairn	Scheduled Monument	Minor	N/A	N/A	Minor
Ferness Village	Listed Building Category B	Very Minor	N/A	N/A	Very Minor
Levrattich Cairn	Scheduled Monument	Very Minor	N/A	N/A	Very Minor
Grouse Butts (Potential WW2 Trenches) (SLR7)	HER Monuments	Very Minor	Watching Brief Recording in the archaeological record and preservation in situ where possible	Planning Condition	Nil
Trackway (SLR111)	HER Monument	Negligible	Watching Brief Recording in the archaeological record and preservation in situ where possible	Planning Condition	Nil

References

Legislation

- The Ancient Monuments and Archaeological Areas Act 1979;
- The Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997; and
- The Historic Environment (Amendment) (Scotland) Act 2011;

Policy

- Scottish Planning Policy (2014), especially *Valuing the Historic Environment* paragraphs 135-151;
- Historic Environment Circular 1 May 2016-;
- Historic Environment Policy for Scotland May 2019;
- Planning Advice Note 2/2011: Planning and archaeology;

Regulations

- Statutory Instrument No 101 The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017;

Guidance

- HES 2016a Managing Change in the Historic Environment: Setting
- HES 2016b *Scotland's Listed Buildings 2016*
- HES 2016c *Scotland's Scheduled Monuments 2016*
- HES 2016d Policy Statement June 2016
- SNH and HES Environmental Impact Assessment Handbook: Guidance for competent authorities, consultation bodies, and others involved in the Environmental Impact Assessment Process in Scotland 2018;
- Chartered Institute for Archaeologists Standard and Guidance for Historic Environment Desk Based Assessment 2014;
- Our Place in Time 2019 *A Guide to Climate Change Impact on Scotland's Historic Environment*;

Sources:

- HES Designation pages for site descriptions and history.
 - Lochindorb Castle (SM 1231)
 - Levrattich, cairn 340m W of (SM 11738)
 - Aitnoch, cairn, hut circle & field system 1400m SSE of (SM 4362)
 - Dunearn, fort 510m S of (SM 2470)
 - Ardclach Bell Tower (LB 551)
 - Darnaway Castle (LB 2283)
 - Relugas (GDL 00325)
 - Darnaway Castle (GDL 00133)
 - Logie Bridge (LB564)
 - Ferness Village (LB5103)
 - Burnside Bridge (SM11832)
- Canmore HER
- Fraser, I. 2008. *The Pictish Symbol Stones of Scotland*
- Kirkdale Archaeology. 2004. *Desk Based Assessment and Site Walkover for Cairn Duhie*
- CFA Archaeology Ltd. 2013. *Environmental Impact Assessment for Cairn Duhie Wind Farm. Chapter 10: Cultural Heritage Chapter.*

Cartographic Sources:

Map	Date	Title/Sheet	Scale
Roy's Military Map	1743-45		
Arron Arrowsmith	1807		

Ordnance Survey	1871	Elgin, Sheet XX,	Six Inch
Ordnance Survey	1894	Nairn & Moray Firth (84)	One Inch
Ordnance Survey	1900	Nairn & Moray Firth (84),	Six Inch
Ordnance Survey	1955	NH94SE	One Inch

Chapter 7: Ecology

7. Ecology

Introduction

- 7.1 This chapter considers the likely significant effects on ecology associated with the construction and operation of the proposed Cairn Duhie Wind Farm (hereafter referred to as ‘the proposed development’). The specific objectives of the chapter are to:
- describe the ecological baseline;
 - describe the assessment methodology and significance criteria used in completing the impact assessment;
 - describe the potential effects, including direct, indirect and cumulative effects;
 - describe the mitigation measures proposed to address likely significant effects; and
 - assess the residual effects remaining following the implementation of mitigation.
- 7.2 Effects on avian fauna (birds) are addressed separately in Chapter 8: Ornithology. The effects on hydrology are addressed in Chapter 9: Hydrology, Hydrogeology, Geology and Peat. Chapter 9 also considers the hydrological impacts on Groundwater Dependent Terrestrial Ecosystems (GWDTEs) identified in the ecology assessment.
- 7.3 Good Practice Measures to avoid pollution of watercourses on and adjacent to the site, and details of standard practice construction environmental management, are detailed in Chapter 4: Development Description, Appendix 4.2: Outline Construction and Decommissioning Environmental Management Plan (CDEMP) and Appendix 4.3: Draft Peat Management Plan.
- 7.4 The assessment has been carried out by MacArthur Green and in accordance with NatureScot¹ guidelines. All staff contributing to this chapter have undergraduate and/or postgraduate degrees in relevant subjects, have extensive professional ecological impact assessment and ecological survey experience, hold professional membership of the Chartered Institute of Ecology and Environmental Management (CIEEM), and abide by the CIEEM Code of Conduct.
- 7.5 The chapter is supported by:
- Appendix 7.1: National Vegetation Classification & Habitats Survey Report;
 - Appendix 7.2: Protected Species Survey Report;
 - Appendix 7.3: Bat Survey Report; and
 - Appendix 7.4: Outline Habitat Management Plan.
- 7.6 Figures 7.1-7.9 are referenced in the text where relevant.

Planning

- 7.7 The following planning policy documents that are of particular relevance to the chapter are:

- Scottish Biodiversity Strategy: It’s in Your Hands (2004)/2020 Challenge for Scotland’s Biodiversity (2013);
- Highland Council Biodiversity Duty Delivery Plan (2015/2017); and
- UK Post-2010 Biodiversity Framework (2012).

Scope of Assessment

Effects Assessed in Full

- 7.8 This chapter considers the effects of construction and operation (including cumulatively) of the proposed development upon those ecological features identified during the review of desk-based information and field surveys. Effects upon the following features are assessed:
- designated sites: effects include direct (i.e. derived from land-take or disturbance to habitats or protected species) and indirect (i.e. changes caused by effects to supporting systems such as groundwater);
 - terrestrial habitats: effects include direct (i.e. derived from land-take) and indirect (i.e. changes caused by effects to supporting systems such as groundwater or overland flow);
 - aquatic habitats: effects are limited to the ecological impacts of changes in water conditions through potential pollution effects; hydrological effects are considered in Chapter 9: Hydrology, Hydrogeology, Geology and Peat; and
 - protected species: effects considered include direct (i.e. loss of life as a result of the proposed development; 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).

Effects Scoped Out

- 7.9 On the basis of the professional judgement of the EIA team, experience from other relevant projects and policy guidance or standards, and feedback received from consultees, the following topic areas have been ‘scoped out’ of detailed assessment, as proposed in the EIA Scoping Report (refer to Appendix 2.1 for a summary of the key issues raised at Scoping and how these have been addressed within the EIA Report).
- 7.10 Effects on generally common and widely distributed habitats or species outwith the following categories have been scoped out:
- Habitats on Annex I to the Habitats Directive, and species on Annex II to the Habitats Directive;
 - Biodiversity Action Plan (UKBAP) or Scottish Biodiversity List (SBL) Priority Habitats; and

¹ Scottish Natural Heritage (SNH) changed its name to NatureScot at the end of August 2020; due to the timescales in which the Cairn Duhie EIA Report was drafted, these terms are used interchangeably within this chapter.

- Habitats or species protected by other legislation such as The Wildlife and Countryside Act 1981 (as amended), the Nature Conservation (Scotland) Act 2004 (as amended), or The Protection of Badgers Act 1992.

- 7.11 Effects on statutory designated sites, Lower Findhorn Woods Site of Special Scientific Interest (SSSI) and Special Area of Conservation (SAC) and Moidach More SSSI/SAC, have been scoped out of detailed assessment due to their respective qualifying features, distance and lack of connectivity to the site (located 2.8km and 3.5km away respectively), therefore direct and indirect impacts are unlikely. This approach was outlined in the EIA Scoping Report and agreed by consultees.
- 7.12 Effects on ancient woodland are also scoped out of detailed assessment. No ancient woodland is present within the site and no woodland removal resulting from the proposed development will occur in areas of ancient woodland. Also, no impairment of woodland habitat connectivity is expected to result from the construction and operation of the proposed development. Consequently, potential effects on ancient woodland are scoped out from detailed assessment. This approach was outlined in the EIA Scoping Report and agreed by consultees.
- 7.13 Further effects have subsequently been scoped out based on the results of the desk-based study and survey work undertaken for the proposed development. Details of effects scoped out post survey are provided in paragraphs 7.136 to 7.148 below.

Assessment Methodology

Legislation and Guidance

Legislation

- 7.14 The assessment has been undertaken in accordance with the following European and National legislation:
- Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora ('Habitats Directive');
 - Council Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy ('Water Framework Directive');
 - Environmental Impact Assessment Directive 2014/52/EU;
 - Nature Conservation (Scotland) Act 2004 (as amended);
 - The Conservation (Natural Habitats &c.) Regulations 1994 (as amended) 'The Habitats Regulations');
 - The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017;
 - The Water Environment and Water Services (Scotland) Act 2003 (WEWS);
 - The Water Environment (Controlled Activities) (Scotland) Regulations 2011;
 - The Wildlife and Countryside Act 1981 (as amended);
 - The Wildlife and Natural Environment (Scotland) Act 2011 (WANE); and
 - The Protection of Badgers Act 1992.

Guidance

- 7.15 This assessment has been carried out in accordance with the principles outlined in the following documents:
- CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (version 1.1). Chartered Institute of Ecology and Environmental Management, Winchester;
 - Collins, J. (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edition). Bat Conservation Trust;
 - Hundt, L. (2012) Bat Surveys: Good Practice Guidelines, 2nd Edition, Bat Conservation Trust;
 - Joint Nature Conservation Committee (JNCC) (2013) Guidelines for selection of biological Sites of Special Scientific Interest (SSSI);
 - Natural England (2014) Natural England Technical Information Note TIN 051. Bats and Onshore Wind turbines - Interim Guidance (3rd Edition);
 - Scottish Executive (2000) 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;
 - Scottish Government (2013) 2020 Challenge for Scotland's Biodiversity;
 - Scottish Government (2016) Draft Peatland and Energy Policy Statement;
 - Scottish Government (2017) Planning Advice Note 1/2013 - Environmental Impact Assessment, Revision 1.0;
 - Scottish Government (2001) European Protected Species, Development Sites and the Planning Systems: Interim guidance for local authorities on licensing arrangements;
 - Scottish Government (2018) Climate Change Plan: Third Report on Policies and Proposals 2018-2032;
 - Scottish Government (2010) Management of Carbon-Rich Soils;
 - Scottish Government (2017) Planning Circular 1/2017: Guidance on The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017;
 - Scottish Environment Protection Agency (SEPA) (2017) Land Use Planning System Guidance Note 4 - Planning guidance on on-shore windfarm developments;
 - Scottish Renewables, SNH, SEPA, Forestry Commission (Scotland), Historic Environment Scotland & AEECoW (2019) Good Practice During Windfarm Construction (4th Edition);
 - SEPA (2017) Land Use Planning System Guidance Note 31 - Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems;
 - SNH (2012) Assessing the Cumulative Impact of Onshore Wind Energy Developments;
 - SNH (2013) Planning for Development: What to consider and include in Habitat Management Plans;
 - SNH (2016) Planning for Development: What to consider and include in deer assessments and management at development sites (Version 2);

- SNH (2018) Environmental Impact Assessment Handbook - Version 5: Guidance for competent authorities, consultation bodies, and others involved in the Environmental Impact Assessment process in Scotland; and
- SNH, Natural England, Natural Resources Wales, RenewableUK, Scottish Power Renewables, Ecotricity Ltd, the University of Exeter & Bat Conservation Trust (BCT) (2019) Bats and Onshore Wind Turbines: Survey Assessment and Mitigation.

Consultation

7.16 In undertaking the assessment, consideration has been given to the EIA scoping responses and other consultation undertaken as detailed in Table 7.1 below.

Table 7.1 - Consultation Responses

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action
Scottish Government Energy Consents Unit (ECU) 13 th May 2020	Formal Scoping Consultation	Requested that Findhorn District Salmon and Fishery Board and Findhorn, Nairn and Lossie Trust be contacted for information on local fish stocks.	Both consultees have been contacted as part of the EIA Scoping Opinion, and the desk study (see paragraph 7.19).
The Highland Council (THC) 27 th March 2020	Formal Scoping Consultation	The EIA Report should provide a comprehensive baseline survey of animal (mammals, reptiles, amphibians, etc) interest onsite.	Detailed baseline surveys were undertaken to inform the assessment and the details are presented within this chapter (see Baseline Conditions).
		It is expected that the EIA Report will address whether or not the development could assist or impede the delivery of elements of relevant Biodiversity Action Plans.	As per the assessment within this chapter there are no adverse significant effects on ecological receptors at the site and therefore the proposed development is not considered to impede the delivery of relevant Biodiversity Action Plans (BAPs). The inclusion of an Outline Habitat Management Plan (OHMP) (Appendix 7.4) through its focus on blanket bog and wet heath could assist in delivery of relevant BAP aims.
		The EIA Report should address the likely impacts on the nature conservation interests of all the designated sites in the vicinity of the proposed development and provide	Assessment of impacts and appropriate mitigation measures are included within this chapter.

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action
		proposals for any mitigation that is required.	
		If wild deer are present or will use the site an assessment of the potential impact on deer will be required. This should address deer welfare, habitats and other interests.	Effects on wild deer are considered in paragraph 7.147.
		The EIA Report must address aquatic interests within local watercourses, including downstream interests that may be affected by the development, and consultation should be undertaken with the local fishery board where relevant.	The Findhorn, Nairn and Lossie Fisheries Trust and the Findhorn District Salmon Fisheries Board have been contacted as part of the Scoping consultation process and the desk study (see paragraph 7.19).
		The EIA Report should include an assessment of the effects on Ground Water Dependent Terrestrial Ecosystems (GWDTE).	An assessment of effects on GWDTE has been undertaken and the findings are presented in Chapter 9: Hydrology, Hydrogeology, Geology, and Peat.
		The Scottish Government's Control of Woodland removal Policy must be addressed, and compensatory planting calculations provided in the EIA Report regarding any areas of woodland likely to be affected by the proposed development.	Minor felling required to facilitate construction and operation of the proposed development. Details of felling and re-planting are provided in Chapter 4: Development Description.
East Nairnshire Community Council 17 th March 2020	Formal Scoping Consultation	Additional species such as brown hare and mountain hare should be surveyed.	The scope of the protected species surveys has been agreed with SNH. Any anecdotal sightings of brown hare and mountain hare are noted within this chapter.
		The Scoping Report does not refer to the regeneration of native woodlands which are important wildlife corridors.	This chapter considers potential effects on habitats likely to be affected by the proposed development. Details of forestry related issues are outlined in Chapter 4: Development Description.

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action
		Protection of developing scrub and birch margin along the site boundary with the A939 should be put in place and, if possible, enhanced by new planting and protection from deer grazing.	Forestry related issues are addressed in Chapter 4: Development Description.
Scottish Natural Heritage 3 rd April 2020	Formal Scoping Consultation	Acceptable to scope out other designated sites (other than Special Protection Areas assessed in Chapter 8: Ornithology) within 10km of the proposed development as it is not considered that these sites will be directly or indirectly affected.	Noted.
		The scoping report states that no evidence was found in the 2019 survey of otter and wildcat. These surveys should be detailed along with any mitigation measures in the EIA Report, in a confidential annex if necessary.	Details of all baseline surveys are presented within this chapter. All appropriate mitigation measures will be outlined in this chapter and a Species Protection Plan (SPP).
		While it is agreed that bat activity is likely to be low, the Scoping Reports indicates there are bat species present on the site. Therefore, a species protection plan highlighting mitigation measures for this species should be included in the EIA Report.	A SPP will be developed post consent and pre-construction.
		Given the suitable habitat onsite in relation to water voles, the EIA Report should include Species Protection Plans, including mitigation measures, for otter, water vole and wildcat.	The SPP for all relevant species will be developed post consent and pre-construction.
		The EIA Report should include details of all field survey work undertaken, including methodology.	Details of all fieldwork undertaken is detailed within this chapter and methods are described in full in Appendices 7.1-7.3.
Scottish Natural Heritage 16 th June 2020	Formal Scoping Consultation - additional comments	Confirmed that given the survey information available, and in line with existing guidance, the approach outlined in the Scoping	Noted.

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action
		Report is sufficient with regards to the ornithological and bat baseline data.	
SEPA 16 th March 2020	Formal Scoping Consultation	Noted that appropriate buffers will be provided around identified GWDTEs to ensure any impacts are kept to a minimum and recommended that the Applicant refers to Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and GWDTE for further advice and the minimum information required to be submitted.	Potential effects on GWDTEs are set out in Chapter 9: Hydrology, Hydrogeology, Geology and Peat.
		A map demonstrating that all GWDTE are outwith a 100m radius of all excavations shallower than 1m and outwith 250m of all excavations deeper than 1m and proposed groundwater abstractions is required.	Potential effects on GWDTEs are set out in Chapter 9: Hydrology, Hydrogeology, Geology and Peat.
		If micro-siting is to be considered as a mitigation measure the distance of survey must be extended by the proposed maximum extent of micro-siting and needs to extend beyond the site boundary where the distances require it.	Potential effects on GWDTEs are set out in Chapter 9: Hydrology, Hydrogeology, Geology and Peat. Habitats surveys extended as far as access permissions allowed (see Figures 7.3 and 7.4).
		If the minimum buffers above cannot be achieved, a detailed site specific qualitative and/or quantitative risk assessment will be required. We are likely to seek conditions securing appropriate mitigation for all GWDTE affected.	Potential effects on GWDTEs are set out in Chapter 9: Hydrology, Hydrogeology, Geology and Peat.
		Watercourses will be buffered by at least 50m from all proposed turbine and infrastructure locations, except where watercourse crossings may be required.	Watercourses have been buffered by 50m as per paragraph 7.130.
Marine Scotland		Noted that the Findhorn District Salmon and Fishery	Findhorn, Nairn and Lossie Fisheries Trust and the

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action
10 th March 2020		Board and Findhorn, Nairn and Lossie Trust should be consulted.	Findhorn District Salmon Board have been consulted as part of the consultation process and the desk study (see paragraph 7.19)
John Muir Trust 6 th April 2020		Stated that they have no comments on the proposed development to make at this stage.	Noted.
Scottish Forestry 3rd March 2020		Scottish Forestry does not agree with the proposal to scope out the impacts of the proposed development upon forestry and should be included within the EIA Report.	All details relating to forestry and any felling and replanting are provided in Chapter 4: Development Description.

Baseline Characterisation

Study Area

- 7.17 A range of surveys were conducted to accurately record baseline ecological conditions within the red line boundary of the proposed development ('the site') and appropriate survey buffers defined as 'study areas'.
- 7.18 The areas within which the desk-based research and field surveys were undertaken varied depending on the ecological feature and its search/survey requirements. Details of the extent of each search/study area are described in the relevant sections in the Baseline Conditions section of this chapter and associated Appendices 7.1-7.3, and their respective Figures. Hereafter in this chapter, the areas covered by field surveys and assessment are collectively referred to as the 'study area'.

Desk Study

- 7.19 A desk study was undertaken to collate available ecological information in relation to the proposed development and surrounding environment. This comprised a search of available online datasets and sourcing available historical ecological survey reports covering the study area. The following sources were consulted:
- SNH Sitelink² for designated site information within 5km of the proposed development;

- Ancient Woodland Inventory (Scotland)³ for ancient woodland sites within 5km of the proposed development;
- Highland Biological Recording Group (HBRG) for protected/notable species within 10km of the proposed development (from the last 15 years);
- National Biodiversity Network (NBN) Atlas website⁴ within 5km of the proposed development (10km for fish) (from the last 15 years);
- Saving Scotland's Red Squirrels for red squirrel sightings up to 5km from the site (records from the last 10 years);
- Findhorn, Nairn and Lossie Fisheries Trust (FNLFT) for fish density data within the proposed development;
- Findhorn District Salmon and Fishery Board (Findhorn DSFB) for fish density data within the proposed development;
- British Deer Society Deer Distribution Survey Results (2016)⁵;
- SNH Carbon and Peatland Map (SNH, 2016)⁶;
- The Cairn Duhie Wind Farm Environmental Statement (ES) (2012) and associated Appendices (i.e. the 'consented development', consented July 2017); and
- Any ES/EIA reports or technical reports from other developments or proposed developments in the local area.

Field Survey

- 7.20 There is extensive information available from the baseline surveys and assessments completed for the consented development in 2012. This was used to help inform the scope of the survey and assessment work required for the proposed development. Additional fieldwork was carried out in 2019 to supplement and update the existing baseline data set and inform the assessment. These surveys were undertaken in line with standard methodologies and guidance (refer to Appendices 7.1-7.3 for details).
- 7.21 Therefore, the baseline field survey work used in this assessment is as follows:
- National Vegetation Classification (NVC) and Phase 1 habitats surveys - (June 2012);
 - Phase 1 peat depth survey and blanket mire condition assessment - (February and June 2012);
 - Phase 2 peat probing and peat coring survey (April 2013);
 - Protected species surveys (with particular focus on otter (*Lutra lutra*), wildcat (*Felis silvestris*), water vole (*Arvicola amphibious*), badger (*Meles meles*), pine marten (*Martes martes*) and red squirrel (*Sciurus vulgaris*) (May 2012);
 - Bat surveys, including Preliminary Roost Assessment (PRA), spatial transect surveys, and automated static (anabat) surveys (April to October 2012);

² SNH (n.d.). SNH Sitelink. Available at: <https://sitelink.nature.scot/home>. Accessed on: 05/11/2019.

³ Scottish Government (2015). Ancient Woodland Inventory (Scotland). Available at: <https://data.gov.uk/dataset/c2f57ed9-5601-4864-af5f-a6e73e977f54/ancient-woodland-inventory-scotland>. Accessed on: 05/11/2019.

⁴ NBN Atlas Partnership (2017). NBN Atlas. Available at: <https://data.nbn.org.uk/>. Accessed on: 06/01/2020.

⁵ The British Deer Society (2016). Deer Distribution Survey. Available at: <https://www.bds.org.uk/index.php/research/deer-distribution-survey>. Accessed on: 06/01/2020.

⁶ SNH (2016). The Carbon and Peatland Map. Available at: <https://www.nature.scot/professional-advice/planning-and-development/natural-heritage-advice-planners-and-developers/planning-and-development-soils/carbon-and-peatland-2016>. Accessed on: 06/01/2020.

- Fisheries (electrofishing) surveys (August and September 2012);
- Updated NVC and Phase 1 habitats surveys (including identification of potential GWDTEs) (December 2019);
- Updated protected species surveys (with particular focus on otter, wildcat, water vole, badger, pine marten, red squirrel, and including a great crested newt (*Triturus cristatus*) (GCN) Habitat Suitability Index (HSI) survey - (December 2019)); and
- Updated Preliminary Bat Roost Assessment (PRA) (December 2019).

7.22 Bat activity surveys undertaken across the site for the consented development in 2012 recorded only common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*Pipistrellus pygmaeus*), brown long-eared bat (*Plecotus auritus*) and Daubenton's bat (*Myotis daubentonii*), with low levels of bat activity recorded across the site. The assessment for the consented development concluded a negligible effect on bats. There has been no major habitat or land use change on the site since the previous assessment that would alter bat use or activity levels over the site, and furthermore the design considerations noted in paragraph 7.130 will allow for the avoidance and protection of linear habitat features. Therefore, no further bat activity surveys were undertaken and this approach was agreed in communication with SNH on the 3rd April and 16th June 2020 (Table 7.1).

7.23 Based on revised guidance (SNH *et al.*, 2019⁷) that has been released since the original surveys were undertaken, the bat data has been re-analysed using the Ecobat (Mammal Society, 2017⁸) tool to allow for an objective measure of relative bat activity to be undertaken with comparable sites and weather conditions. This tool allows for a site risk assessment to be undertaken and a refinement of potential effects and mitigation measures, detailed in paragraph 7.133.

7.24 The full suite of survey methods, species specific legislation, results, and details of any weather or survey limitations are provided within Appendices 7.1-7.3 respectively; study areas are shown in Figures 7.3 to 7.8.

Assessing Significance

7.25 This section defines the methods used to assess the significance of effects on Important Ecological Features (IEFs) through the process of an evaluation of Nature Conservation Value, Conservation Status and Magnitude of Effect.

7.26 The evaluation for wider-countryside interests (i.e. interests unrelated to a SAC) involves the following process:

- identifying the potential effects of the proposed development, including both beneficial and adverse;
- considering the likelihood of occurrence of potential effects where appropriate;

- defining the nature conservation value of the important ecological features present
- establishing the feature's conservation status where appropriate;
- 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, suggesting measures to mitigate or compensate the effect where required; and
- confirming residual effects after mitigation, compensation or enhancement.

Sensitivity Criteria

7.27 There can often be varying degrees of uncertainty over the sensitivity or magnitude of effects as a result of limited information. A precautionary approach is therefore adopted where the response of a population to an effect is uncertain. Assessment assumptions/limitations are set out further below in this chapter.

Determining Nature Conservation Value

7.28 Nature Conservation Value is defined on the basis of the geographic context given in Table 7.2 (which follows the standard guidance (CIEEM, 2018⁹)). Attributing a value to an ecological feature is generally straightforward in the case of designated sites, as the designations themselves are normally indicative of an importance level. For example, a SAC, designated under the Habitats Directive, is implicitly of European (International) importance. In the case of species, assigning value is less straightforward as contextual information about distribution and abundance is fundamental, including trends based on historical records. This means that even though a species may be protected through legislation at a national or international level, the relative value of the population onsite 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 therefore of local or regional value rather than national or international).

7.29 Where possible, the valuation of habitat/populations within this assessment makes use of any relevant published evaluation criteria (e.g. The SBL (Scottish Government, 2013¹⁰), Joint Nature Conservancy Council (JNCC) on selection of biological SSSIs (JNCC, 2013¹¹)). Furthermore, JNCC guidance (JNCC, 2014¹²) has been consulted, where relevant, so that cross-referencing of classifications within different systems can be standardised (e.g. correctly matching NVC types with Annex I habitats where relevant).

7.30 Where relevant, information regarding a feature's conservation status is also considered to fully define its importance. This enables an appreciation of current population or habitat trends to be incorporated into the assessment.

⁷ Scottish Natural Heritage, Natural England, Natural Resources Wales, Renewable UK, Scottish Power Renewables, Ecotricity Ltd, the University of Exeter & Bat Conservation Trust (BCT). (2019). Bats and Onshore Wind Turbines: Survey Assessment and Mitigation.

⁸ Mammal Society (2017). Ecobat Tool. Available at: <http://www.mammal.org.uk/science-research/ecostat/>

⁹ CIEEM (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (3rd Edition).

¹⁰ Scottish Government (2013). Scottish Biodiversity List. Available at: <http://www.gov.scot/Topics/Environment/Wildlife-Habitats/16118/Biodiversitylist/SBL>.

¹¹ JNCC (2013). *Guidelines for Selection of Biological SSSIs*. Available at: <http://jncc.defra.gov.uk/page-2303>.

¹² JNCC (2014). *NVC & Other Classifications*. Available at: <http://jncc.defra.gov.uk/page-4266>

Table 7.2 - Approach to Valuing Ecological Features (adapted from Hill *et al.*, 2005¹³)

Nature Conservation Importance of Feature in Geographical Context	Description
International/European	An internationally or European designated site (e.g. RAMSAR/SAC).
	Site meeting criteria for international designations or qualifying species of a SAC where there is connectivity.
	Species present in internationally important numbers (>1% of biogeographic populations).
National (UK)	A nationally designated site (SSSI, or a National Nature Reserve (NNR)), or sites meeting the criteria for national designation or qualifying species where there is connectivity.
	Species present in nationally important numbers (>1% UK population).
County/Regional (National Heritage Zone or Local Authority Area)	Species present in regionally important numbers (>1% of Natural Heritage Zone population).
	Areas of habitat falling below criteria for selection as a SSSI (e.g. areas of semi-natural ancient woodland larger than 0.25 hectares (ha)).
Local	Local Nature Reserves (LNR).
	Areas of semi-natural ancient woodland smaller than 0.25ha.
	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. Features falling below local value are not normally considered in detail in the assessment process.

7.31 IEFs to be assessed were taken to be those features of local, regional, national and international importance.

Magnitude of Effect

7.32 Determining the magnitude of any likely effects requires an understanding of how the ecological features are likely to respond to the proposed development. This change can occur during construction or operation of the proposed development.

7.33 Effect magnitude refers to changes in the extent and integrity of an ecological feature. A suitable definition of ecological ‘integrity’ is found within Scottish Executive Circular 6/1995, updated in Scottish Executive (2000)¹⁴ 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

designated sites (SACs and SPAs), it is applied to wider countryside habitats and species for the purposes of this assessment.

7.34 Effects can be adverse, neutral or beneficial. Effects are judged in terms of magnitude in space and time. There are five levels of spatial effect and five levels of temporal effect as described in Table 7.3 and Table 7.4 respectively.

Table 7.3 - Definition of Spatial Effect Magnitude upon IEFs

Significance of Effect	Description
Very High	Would cause the loss of the majority of a feature (>80%) or would be sufficient to damage a feature sufficient to immediately affect its viability.
High	Would have a major effect on the feature or its viability. For example, more than 20% habitat loss or damage.
Moderate	Would have a moderate effect on the feature or its viability. For example, between 10 - 20% habitat loss or damage.
Low	Would have a minor effect upon the feature or its viability. 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 7.4 - Definition of Temporal Effect Magnitude upon IEFs

Temporal Magnitude	Description
Permanent	Effects continuing indefinitely beyond the span of one human generation (taken here as 30+ 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) 30 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

7.35 The significance of potential effects is determined through a standard method of assessment based on professional judgement and available evidence, considering the nature conservation value of the IEF and the magnitude of change, in a reasoned way.

7.36 Table 7.5 details the significance criteria that are used in assessing the effects of the proposed development.

¹³ Hill, D., Fasham, M., Tucker, G., Shewry, M., and Shaw, P. (2005). Handbook of Biodiversity Methods - Survey, Evaluation and Monitoring. Cambridge University Press.

¹⁴ Scottish Executive (2000). 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.

Table 7.5 - Significance Criteria

Significance of Effect	Description
Major	Significant effect, as the effect is likely to result in a long term significant adverse effect on the integrity of the feature.
Moderate	Significant effect, as the effect is likely to result in a medium term or partially significant adverse effect on the integrity of the feature.
Minor	The effect is likely to adversely affect the feature at an insignificant level by virtue of its limited duration and/or extent, but there will probably be no effect on its integrity. The level of effect would be Minor and not significant.
Negligible	No material effects. The effect is assessed to be not significant.

7.37 Using these definitions, it is decided whether there could be any effects which will be sufficient to adversely affect the IEF to the extent that its conservation status deteriorates significantly above and beyond that which will be expected should baseline conditions remain (i.e. the 'do nothing' scenario).

7.38 Major and moderate effects are considered significant in with the context of the EIA Regulations.

Cumulative Assessment

7.39 SNH's cumulative assessment guidance (SNH, 2012¹⁵) is used to inform the cumulative assessment in this chapter. 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, projects or activities. However, in the interests of focusing on the potential for significant effects, this assessment considers the potential for cumulative effects with other EIA developments. The context in which these effects are considered is heavily dependent on the ecology of the feature 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, whereas for blanket bog, the region or the Natural Heritage Zone (NHZ) may be the relevant spatial scale. Therefore, an assessment of cumulative effects will be made for each feature, appropriate to its ecology.

Assessment Limitations

7.40 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.

7.41 Updated NVC and habitat surveys were undertaken from 2nd to 4th December 2019 inclusive, and were therefore undertaken outwith the optimal survey period for habitat surveys. Due to the main purpose of the surveys being to verify existing data, update and amend mapping boundaries and habitat classifications (if required) from the previous surveys in June 2012 (i.e. the optimal survey period) for the consented development, this constraint was considered not to affect the validity of the survey results, or the robustness of any assessments made from these data. Furthermore, given the types of habitats present on the site, these are still readily identifiable in winter due to the nature of the vegetation, therefore the results are deemed to be a robust assessment of the NVC communities on the site.

7.42 All protected species survey work was undertaken during appropriate conditions and seasons, with the exception of part of the GCN HSI assessment and the water vole survey. The estimates of two factors within the HSI assessment of ponds (shade and macrophytes) are recommended to be undertaken between May and the end of September¹⁶ to allow for an accurate assessment of vegetation cover during the main GCN active period. Although the HSI assessment for the site was undertaken in December 2019, submerged vegetation from the main 2019 flowering season was still apparent. It was also possible to accurately estimate levels of shading due to pond being located within open grassland with no shade from surrounding trees or buildings (see Appendix 7.2) therefore the results are deemed to be a robust assessment of potential GCN usage of the site.

7.43 Protected species surveys were undertaken outwith the water vole breeding season (mid-May to mid-September), when field signs are most apparent. Previous surveys undertaken in 2012 identified the watercourses within the site as offering limited suitability for water vole and no evidence of the species was identified. Due the nature of the vegetation during the survey and the limited suitable habitat for the species, it was possible to determine the presence or likely absence of burrows at this time of year, therefore, the results detailed in Appendix 7.2 are deemed to be a robust assessment of water vole usage of the site.

7.44 The limitations and assumptions related to the bat survey data are outlined within Appendix 7.3 and are mainly associated with the collection and analysis of the temporal survey data. These constraints are not considered to affect the validity of the survey results, or the robustness of any assessments made from collected data.

7.45 Ecological surveys are limited by factors which affect the presence of plants and animals such as the time of year and behaviour. The ecological surveys undertaken to support the proposed development have not therefore produced a complete list of plants and animals and the absence of evidence of any particular species should not be taken as conclusive proof that the species is not present or that it would not be present in the future.

¹⁵ SNH. (2012). Assessing the Cumulative Impacts of Onshore Wind Energy Developments.

¹⁶ Oldham, R.S., Keeble, J., Swan, M.J.S. and Jeffcote, M. (2000). *Evaluating the Suitability of Habitat for the Great Crested Newt (Triturus cristatus)*. Herpetological Journal, Vol. 10 pp.143-155.

7.46 Whilst some minor information gaps have been identified, it is considered that there is sufficient information to enable an informed decision to be taken in relation to the identification and assessment of likely significant environmental impacts on ecology.

Baseline Conditions

7.47 This section details the results of the desk study and field surveys, providing the baseline conditions for the site, including:

- Designated sites (not including ornithology) within 5km of the site;
- Desk study results;
- Habitats and vegetation; and
- Protected or notable species recorded during baseline surveys.

Designated Sites and Desk Study

Designated Sites

7.48 There are no statutory designations with ecological features within the site. There are two SACs and two SSSIs within 5km of the site that contain ecological features. The closest designated site is the Lower Findhorn Woods SSSI and SAC, at 2.8km from the site, and the Moidach More SSSI and SAC is located 3.5km from the site. These are listed in Table 7.6 and shown on Figure 7.1.

7.49 Sites designated for ornithological interests and any ornithological qualifying features are discussed in Chapter 8: Ornithology.

Table 7.6 - Designated Sites with Ecological Features within 5km of the Site

Designated Site	Qualifying Ecological Features	Condition	Distance from Site ¹⁷
Lower Findhorn Woods SSSI	Upland mixed ash woodland, bryophyte assemblage, lichen assemblage, and Oligotrophic river/stream	Mixed woodland - Unfavourable Declining (25/09/2012) Bryophyte assemblage - Favourable Maintained (19/09/2010) Lichen assemblage - Unfavourable No Change (17/09/2009) Oligotrophic river/stream - Favourable Maintained (09/07/2003)	2.8km
Lower Findhorn Woods SAC	Mixed woodland on base-rich soils associated with rocky slopes	Unfavourable Declining (24/09/2012)	2.8km
Moidach More SSSI/SAC	Blanket bog	Unfavourable Recovering (24/09/2008)	3.5km

Desk Study

7.50 There are no areas of ancient woodland within the site (as detailed within the Ancient Woodland Inventory (AWI)), although several areas of ancient woodland are located close to the site (Figure 7.1).

7.51 All records from HBRG are uploaded onto NBN Atlas. A search on NBN Atlas contained records for the following protected or notable species:

- otter;
- water vole;
- wildcat;
- pine marten;
- red squirrel;
- brown hare (*Lepus europaeus*);
- mountain hare (*Lepus timidus*);
- common lizard;
- common toad (*Bufo bufo*);
- palmate newt (*Lissotriton helveticus*); and
- common frog (*Rana temporaria*).

7.52 Records of the invasive non-native species (INNS), American mink (*Neovison vison*), were also returned by the NBN Atlas.

7.53 The Saving Scotland's Red Squirrels sightings map¹⁸ returned records of red squirrel from 2011 and 2014-2019 within 5km of the site.

7.54 Surveys completed for the consented development in 2012 recorded the following species within (or directly adjacent to) the site:

- common pipistrelle;
- soprano pipistrelle;
- daubenton's bat;
- brown long-eared bat;
- badger;
- adder (*Vipera berus*); and
- common lizard.

7.55 Surveys completed by the FNLFT (2012) for the consented development demonstrated that the Dorback Burn and the tributaries around Cairn Duhie support good populations of Atlantic salmon (*Salmo salar*) and brown trout (*Salmo trutta*). No further data was returned by FNLFT (email communication dated: 17th June 2020). All electrofishing data for Findhorn DSFB is compiled and held by FNLFT (email communication dated: 1st July 2020).

¹⁷ Distances are measured from the red line application boundary of the site.

¹⁸ Saving Scotland's Red Squirrels (n.d). Sightings Map. Available at: <https://scottishsquirrels.org.uk/>. Accessed on: 02/12/2019

7.56 Every five years, the British Deer Society undertakes a survey plotting the current distribution of all six species of wild deer in Great Britain and Northern Ireland and uses it to monitor and record changes from the previous survey to see if the range has changed or expanded. The results of the 2016 Deer Distribution Survey indicate the following in the region of the proposed development:

- Red deer (*Cervus elaphus*) were recorded in 2007 and/or 2011 and reconfirmed in 2016;
- Roe deer (*Capreolus capreolus*) were recorded in 2007 and/or 2011 and reconfirmed in 2016; and
- Sika deer (*Cervus nippon*) were recorded in 2007 and/or 2011 and reconfirmed in 2016.

7.57 The Carbon and Peatland Map 2016 was consulted to determine likely peatland classes present at the site. The map provides an indication of the likely presence of peat at a coarse scale. The Carbon and Peatland map has been developed as “a high-level planning tool to promote consistency and clarity in the preparation of spatial frameworks by planning authorities” (SNH, 2016). It identifies areas of “nationally important carbon-rich soils, deep peat and priority peatland habitat” as Class 1 and Class 2 peatlands. Class 1 peatlands are also “likely to be of high conservation value” and Class 2 “of potentially high conservation value and restoration potential”.

7.58 Figure 7.2 indicates that the site is partially underlain by Class 1 peatland, and with just a small area of Class 2 peatland in the north-east. The remainder of the site is made up of Class 3, Class 4, and Class 5 soils. As the Carbon and Peatland map is a high-level tool, detailed habitat and peat surveys have also been carried out across the site to inform the site assessment on peatland and associated habitats, which is required to identify actual effects of the proposal; including siting, design and mitigation. The results of these surveys are discussed below.

7.59 Further desk study results for protected species are referred to in the relevant species sections below.

Field Surveys

7.60 Details regarding field survey methodologies and results are included within Appendices 7.1-7.3. The following section summarises the baseline conditions as identified during these surveys.

Habitat Surveys

7.61 Updated NVC and Phase 1 habitat surveys were undertaken at the site in December 2019 to verify existing data, particularly in key areas of proposed new infrastructure to ensure it remained accurate, and to record any notable change in habitat types or extents. Surveys

followed standard methodologies (Rodwell, 1991-2000¹⁹; 2006²⁰ and JNCC, 2010²¹), and were undertaken within the site as detailed within Appendix 7.1 and illustrated in Figure 7.3. The habitat surveys also identified the presence of potential GWDTEs, in line with SEPA guidance (SEPA, 2017²²).

7.62 The NVC data were also cross-referenced to the Phase 1 Habitat Survey Classification (JNCC, 2010) to allow a broader characterisation of habitats. The extent of Phase 1 habitat types within the site was calculated using the site-specific correlation of NVC communities to their respective Phase 1 types (see Table 7.7 and Appendix 7.1 for details), and their extents mapped within GIS; including within mosaic areas. The results of this analysis are summarised in order of Phase 1 type in Table 7.7; Figure 7.3 displays the Phase 1 and NVC survey results. The Phase 1 shading in Figure 7.3 has been used to broadly characterise stands of vegetation based on the dominant NVC community within a particular area.

Table 7.7 - Phase 1 Habitat Types Within the Site

Phase 1 Habitat Code	Phase 1 Habitat Description	NVC Types & Other Habitats Recorded ²³	Area (ha)	% of site
A1.1.1	Broadleaved Semi-Natural Woodland	W4	5.22	0.79
A1.2.2	Coniferous Plantation Woodland	W18, CP	9.98	1.50
A2.1	Scrub - Dense/Continuous	W23	1.98	0.30
B1.1/B1.2	Unimproved & Semi-Improved Acid Grassland	U4, U5, U6	16.86	2.54
B5	Marsh/Marshy Grassland	MG10, M23	7.94	1.20
D1.1	Dry Dwarf Shrub Heath - Acid	H9, H10, H12	19.86	2.99
D2	Wet Dwarf Shrub Heath	M15	175.30	26.41
E1.6.1	Blanket Bog	M2, M3, M17, M19, M20	395.60	59.61
E1.7	Wet Modified Bog	M25	17.14	2.58
E2.1	Acid/Neutral Flush/Spring	M6	13.32	2.01
E3.2	Basin Mire	M4	0.35	0.05
F1	Swamp	S9	0.05	0.01
G1	Open Water	SW	0.05	0.01
Total			663.65	100.00

¹⁹ Rodwell, J.S. (Ed.) *et al.* (1991 - 2000). British Plant Communities (5 volumes). Cambridge University Press, Cambridge.

²⁰ Rodwell, J.S. (2006). NVC Users' Handbook. ISBN 978 1 86107 574 1.

²¹ Joint Nature Conservancy Council. (2010). Handbook for phase 1 habitat survey - a technique for environmental audit. JNCC, Peterborough.

²² SEPA. (2017). Land Use Planning System SEPA Guidance Note 31: Guidance on Assessing the Impacts of Windfarm Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems. Version 3. Issue date: 11/09/2017.

²³ The full community name or description of habitat type can be cross-referenced to Table 7.8.

7.63 The NVC communities and non-NVC types recorded within the site are provided in Table 7.8 below and include proportions of particular habitat types that are found within the site, including the proportions within mosaic habitats. Full descriptions of the habitats, NVC communities and associated flora of the site are provided in Appendix 7.1.

7.64 A total of 21 NVC communities were recorded within the respective study area along with various associated sub-communities; two non-NVC habitat types were also present. Only a small number of communities or habitat types account for the majority of the study area. As per Table 7.7 and Table 7.8, the most common and widespread communities making up the bulk of the landscape are M15 *Trichophorum germanicum* - *Erica tetralix* wet heath and M19 *Calluna vulgaris* - *Eriophorum vaginatum* blanket mire. To a lesser extent, scattered between the wet heath and blanket bog habitats, are patches and pockets of other habitat types such as acid grassland, marshy grassland, woodland and dry heath.

7.65 Although some large relatively homogeneous stands of vegetation occur, most of the communities often form complex mosaics and transitional areas across the study area. The main communities and habitat types, and their respective site-specific correlations are summarised below in Table 7.8.

Table 7.8 - Summary of NVC Communities Recorded Within the Site

NVC Community Code and Name		Extent in Site (ha)	% of site	Potential Groundwater Dependency	Annex I Habitat Type	SBL Priority Habitat
Woodland & Scrub						
W4, W4c	<i>Betula pubescens</i> - <i>Molinia caerulea</i> woodland	5.22	0.79	High	-	Upland birchwoods (W4) and Wet woodland (W4c)
W18, W18a	<i>Pinus sylvestris</i> - <i>Hylocomium splendens</i> woodland	8.62	1.30	-	-	-
W23	<i>Ulex europaeus</i> - <i>Rubus fruticosus</i> scrub	1.98	0.30	-	-	-
Grasslands						
U4, U4d	<i>Festuca ovina</i> - <i>Agrostis capillaris</i> - <i>Galium saxatile</i> grassland	13.31	2.01	-	-	-
U5	<i>Nardus stricta</i> - <i>Galium saxatile</i> grassland	0.76	0.12	-	-	-

NVC Community Code and Name		Extent in Site (ha)	% of site	Potential Groundwater Dependency	Annex I Habitat Type	SBL Priority Habitat
U6, U6b	<i>Juncus squarrosus</i> - <i>Festuca ovina</i> grassland	2.79	0.42	Moderate	-	-
MG10a	<i>Holcus lanatus</i> - <i>Juncus effusus</i> rush-pasture	7.51	1.13	Moderate	-	-
Heathland						
H9	<i>Calluna vulgaris</i> - <i>Deschampsia flexuosa</i> heath	13.35	2.01	-	European dry heaths	Upland heathland
H10	<i>Calluna vulgaris</i> - <i>Erica cinerea</i> heath	1.96	0.29	-	European dry heaths	Upland heathland
H12	<i>Calluna vulgaris</i> - <i>Vaccinium myrtillus</i> heath	4.55	0.69	-	European dry heaths	Upland heathland
M15, M15a, M15b, M15c	<i>Trichophorum germanicum</i> - <i>Erica tetralix</i> wet heath	175.30	26.41	Moderate	North Atlantic wet heaths with <i>Erica tetralix</i>	Blanket bog (where peat depth is greater than 0.5m) and Upland heathland
Mire						
M2	<i>Sphagnum cuspidatum/fallax</i> bog pool community	0.16	0.02	-	Blanket bog	Blanket bog (where associated with M17 - M20)
M3	<i>Eriophorum angustifolium</i> bog pool community	0.54	0.08	-	Blanket bog	Blanket bog (where associated with M17 - M20)
M4	<i>Carex rostrata</i> - <i>Sphagnum fallax</i> mire	0.35	0.05	-	Transition mires and quaking bogs	Upland flushes, fens and swamps
M6, M6a, M6b, M6c	<i>Carex echinata</i> - <i>Sphagnum fallax/denticulatum</i> mire	13.32	2.01	High	-	Upland flushes, fens and swamps
M17, M17b	<i>Trichophorum germanicum</i> - <i>Eriophorum vaginatum</i> blanket mire	84.42	12.72	-	Blanket bog	Blanket bog

NVC Community Code and Name		Extent in Site (ha)	% of site	Potential Groundwater Dependency	Annex I Habitat Type	SBL Priority Habitat
M19, M19a, M19b, M19c	<i>Calluna vulgaris</i> - <i>Eriophorum vaginatum</i> blanket mire	297.60	44.84	-	Blanket bog	Blanket bog
M20, M20a, M20b	<i>Eriophorum vaginatum</i> blanket mire	12.89	1.94	-	Blanket bog	Blanket bog
M23	<i>Juncus effusus/ acutiflorus</i> - <i>Galium palustre</i> rush-pasture	0.43	0.06	High	-	-
M25a, M25c	<i>Molinia caerulea</i> - <i>Potentilla erecta</i> mire	17.14	2.58	Moderate	-	-
Swamp						
S9	<i>Carex rostrata</i> swamp	0.05	0.01	-	-	Upland flushes, fens and swamps
Non-NVC Community or Feature Types						
CP	Coniferous Plantation (non-NVC type)	1.36	0.20	-	-	-
SW	Standing Water (non-NVC type)	0.05	0.01	-	-	-
Total		663.65				

7.66 A brief description of the main Phase 1 habitats and associated NVC types recorded within the site, roughly in order of abundance, is presented below (full detailed habitat descriptions of each Phase 1 type and NVC community recorded are presented in Appendix 7.3). The survey results are shown on Figure 7.3. In the following paragraphs, where reference is made to NVC community codes, the full community name can be cross-referred to Table 7.8 above.

7.67 **Blanket bog** within the study area is widespread and is represented by the M2 *Sphagnum cuspidatum/fallax* bog pool community, M3 *Eriophorum angustifolium* bog pool community, M17 *Trichophorum germanicum* - *Eriophorum vaginatum* blanket mire, M19 *Calluna vulgaris* - *Eriophorum vaginatum* blanket mire and M20 *Eriophorum vaginatum* blanket mire. This is the most extensive habitat within the study area, covering 60% of the site (Table 7.7). These communities often represent areas of relatively better quality and active blanket bog where *Sphagnum* moss is often more frequent to abundant, although some areas have evidently been subject to historical drainage and peat cutting. Areas of the blanket bog have been anthropogenically impacted in the past through historical drainage and peat cutting, burning and grazing may also have occurred in the past. However, on the whole the blanket bog in the study area, whilst not pristine and partially degraded to varying degrees, does contain a

moderate coverage of *Sphagna* and other peat forming species which would indicate the majority of the bog continues to be active. Much of the M19 blanket mire onsite often grades into other similar mire and wet heath NVC communities creating overlap, transitional areas, and complex mosaics of communities. Some of this is due to natural abiotic factors and environmental gradients at a finer scale, however at the site there is a large degree of overlap as a consequence of past management, such as relatively recent and historical peat harvesting, burning, grazing and drainage affecting the presence and proportions of many plant species and consequently blurring vegetative boundaries. The M19 mire onsite, as a result, most commonly forms mosaics with M15 wet heath, but also with M17 and M20 blanket mire in some areas.

7.68 **Wet dwarf shrub heath** is present extensively across the study area, appearing most dominant within the central areas and, at times, features within mosaics with blanket bog habitat (see Appendix 7.1 and Figure 7.3). This habitat is all in the form of M15 *Trichophorum germanicum* - *Erica tetralix* wet heath. The M15 community is composed of varying mixtures of heather *Calluna vulgaris*, purple moor-grass *Molinia caerulea*, deergrass *Trichophorum germanicum*, and cross-leaved heath *Erica tetralix* as the more dominant species, giving the vegetation its general character. It is generally a variable community in terms of dominants, constants and co-dominants which can change markedly over short distances within the study area. In general, M15 within the study area shares many of its floristics with the local bog communities and grades into these communities where the peat deepens and has an elevated water table and the presence of hares-tail cottongrass *Eriophorum vaginatum* becomes more noticeable. It often gives way to blanket mire on the flatter ground of the study area. Grazing, peat cutting and burning also have important effects on the floristics and structure of this community, and these historical practices have likely extended the coverage of M15 into formerly deeper and wetter peats that would likely have been blanket bog.

7.69 **Acid dry dwarf shrub heath** appears within the study area in the more elevated sections on thinner soils, most extensively across the summit of Cairn Duhie hill, in the form of H9 *Calluna vulgaris* - *Deschampsia flexuosa* heath, H10 *Calluna vulgaris* - *Erica cinerea* heath and H12 *Calluna vulgaris* - *Vaccinium myrtillus* heath. These communities can appear in some cases as both homogenous stands or within mosaics with other mire and heath communities.

7.70 **Wet modified bog** appears in the form of the M25 *Molinia caerulea* - *Potentilla erecta* mire NVC community. The M25 mire areas were identified due to purple moor-grass dominating the field layer within the study area. This community appears most commonly in the form of the M25a *Erica tetralix* sub-community and, on one occasion, as the more species rich M25c *Angelica Sylvestris* sub-community. The M25 mire community was also found within mosaics with other mire, heath and grassland communities.

7.71 **Unimproved and semi-improved acid grassland** is concentrated to the north of the study area. This habitat type is predominately made up of U4 *Festuca ovina* - *Agrostis capillaris* - *Galium saxatile* grassland, although the U5 *Nardus stricta* - *Galium saxatile* grassland and U6 *Juncus squarrosus* - *Festuca ovina* grassland communities each appear infrequently as minor components of mosaics.

- 7.72 **Acid/neutral flush** within the study area is represented by the M6 *Carex echinata* - *Sphagnum fallax/denticulatum* mire NVC community. This community was often found within areas where there are small flushes, runnels or soakways, and along and within occluding ditches and around minor watercourses or as small components of modified bog. The M6 mire community appears in a number of forms within the study area, these being; M6a *Carex echinata* sub-community, M6b *Carex nigra* - *Nardus stricta* sub-community and M6c *Juncus effusus* sub-community. Of these sub-communities M6b and M6c are the most common with M6a appearing as a single isolated patch. M6a and M6b are characterised by the more sedge rich assemblage compared to that of the soft rush *Juncus effusus* dominated M6c sub-community.
- 7.73 **Coniferous plantation woodland** is made up of four woodland blocks located within the very north of the study area, with two of the stands containing semi-mature Scots pine *Pinus sylvestris* and the remaining two containing Sitka spruce *Picea sitchensis*. The stands of Scots pine, although plantation in origin, were recorded as the W18 *Pinus sylvestris* - *Hylocomium splendens* woodland NVC community. The areas of Sitka spruce were recorded as the non-NVC community conifer plantation (CP) which is not represented within the NVC.
- 7.74 **Marsh/marshy grassland** is rare within the within the study area is made up of a single area of M23 *Juncus effusus/acuteiflorus* - *Galium palustre* rush-pasture and some small areas of the MG10 *Holcus lanatus* - *Juncus effusus* grassland community. These rush dominated communities can be found within the north of the study area, the largest of which was found to the south of Muckle Lyne. This habitat was often found to be closely connected with areas of damp ground, particularly along the main watercourses, tributaries and small ponds.
- 7.75 **Broadleaved semi-natural woodland** is present as small scattered patches and fragments along the western boundary of the study area. The canopy is often composed of well established, sometimes mature, broadleaved tree species. This habitat contains the NVC community W4 *Betula pubescens* - *Molinia caerulea* woodland (see Appendix 7.1), with the majority of the woodland being recorded as the W4c *Sphagnum* sub-community. The canopy was dominated with birch *Betula* spp. with a field layer dominated by purple moor-grass with occasional hares-tail cottongrass. The wetter areas being dominated with an extensive bryophyte cover consisting of *Sphagnum capillifolium* and *S. fallax*.
- 7.76 All other habitats make up less than 1% of the site (Table 7.7) and none are of more than local nature conservation value (Table 7.2). Given their limited extents, details of these habitat types can be found within Appendix 7.1.

Groundwater Dependent Terrestrial Ecosystems

- 7.77 The NVC results were referenced against SEPA guidance (SEPA, 2017²⁴) to identify those habitats which may be classified, depending on the hydrogeological setting, as being potentially groundwater dependent (GWDTE). Potential GWDTE NVC communities recorded within the site are summarised in Table 7.8; these are also shown in Figure 7.4.
- 7.78 Within Figure 7.4, the potential GWDTE sensitivity of each polygon containing a potential GWDTE community was classified on a four-tier approach as follows:
- ‘Highly - dominant’ where potential high GWDTE(s) dominate the polygon.
 - ‘Highly - sub-dominant’ where potential high GWDTE(s) make up a sub-dominant percentage cover of the polygon.
 - ‘Moderately - dominant’ where potential moderate GWDTE(s) dominate the polygon and no potential high GWDTEs are present.
 - ‘Moderately - sub-dominant’ where potential moderate GWDTE(s) make up a sub-dominant percentage cover of the polygon and no high GWDTEs are present.
- 7.79 Where a potential high GWDTE existed in a polygon, it outranked any potential moderate GWDTE communities within that same polygon.
- 7.80 GWDTE sensitivity has been assigned solely on the SEPA listings. However, many of the NVC communities on the list are common habitat types across Scotland and generally of low nature conservation value. Furthermore, depending on several factors such as geology, superficial geology, presence of peat and topography, many of the potential GWDTE communities recorded may in fact be only partially groundwater fed or not dependant on groundwater. Because designation as a potential GWDTE is related to groundwater dependency and not nature conservation value, GWDTE status has not been used as criteria to determine a habitat’s nature conservation value. There is however a statutory requirement to consider GWDTEs and the data gathered during the NVC surveys has been used to inform this assessment which is presented in Chapter 9: Hydrology, Hydrogeology, Geology and Peat.
- ### Annex 1 Habitats
- 7.81 Many NVC communities can also correlate to various Annex I habitat types listed under the Habitats Directive²⁵. The fact that an NVC community can be attributed to an Annex I type does not necessarily mean all instances of that NVC community constitute Annex I habitat. Its status can depend on various factors such as quality, extent, species assemblages, geographical setting, and substrates.
- 7.82 NVC survey data and field observations have been compared to JNCC Annex I habitat listings and descriptions²⁶. Those habitats within the site which could be considered Annex I habitats are also summarised in Table 7.8 above. The extents and relatively lower quality (due to

²⁴ SEPA. (2017). Land Use Planning System SEPA Guidance Note 31: Guidance on Assessing the Impacts of Windfarm Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems. Version 3. Issue date: 11/09/2017.

²⁵ Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (EC Habitats Directive).

²⁶ <https://sac.jncc.gov.uk/habitat/>

factors such as peat cutting and drainage) of these Annex I habitats within the site means none are considered of more than local nature conservation value (Table 7.2). Full details and discussion are provided within Appendix 7.1.

Scottish Biodiversity List Priority Habitats

- 7.83 The Scottish Biodiversity List (SBL)²⁷ is a list of animals, plants and habitats that Scottish Ministers consider to be of principal importance for biodiversity conservation in Scotland. The SBL identifies habitats which are the highest priority for biodiversity conservation in Scotland: these are termed 'priority habitats'. Some of these priority habitats are quite broad and can correlate to many NVC types.
- 7.84 Relevant SBL priority habitat types and corresponding associated NVC types recorded within the site are summarised in Table 7.8 above. These SBL priority habitats also correlate with UKBAP Priority Habitats²⁸.

Peatland

- 7.85 As discussed above, according to the Carbon and Peatland Map (SNH, 2016), the site is partially underlain by Class 1 peatland, and with just a small area of Class 2 peatland in the north-east (Figure 7.2). The remainder of the site is made up of Class 3, Class 4, and Class 5 soils. As the Carbon and Peatland Map is a high-level tool, detailed habitat and peat depth surveys have also been carried out across the site.
- 7.86 Phase 1 and Phase 2 peat depth surveys for the consented development were carried out in 2012 and 2013. These surveys indicated the site to be predominately underlain by peat of less than 1m in depth, with much of this being shallow peaty/organo-mineral under 0.5m in depth. There were two notable areas of deep peat, one to the very south by Sidhean a' Tutach and the other in the north-eastern corner of the site. Other small and isolated pockets of deeper peat are scattered throughout the site. These deeper areas have been avoided for the placement of infrastructure as far as practicable within the limits of a suite of environmental constraints. Further details of the peat surveys are provided in Chapter 9: Hydrology, Hydrogeology, Geology and Peat.
- 7.87 The results of the peat depth probing confirm that the Class 1 and Class 2 areas as shown in Figure 7.2 are underlain by peat of varying depths. The habitat surveys described above also indicate that the site is dominated by typically peatland habitat types, in particular there is an abundance of bog and wet heath communities (Figure 7.3).

Protected Species

- 7.88 Full details pertaining to the survey methods employed, legal status, and the survey results of each species below are included within respective Appendices 7.2 and 7.3. The following paragraphs provide a summary for each species, including relevant records from the desk-study.

Otter

- 7.89 Records of otter within 5km of the site were returned by the desk study. No holts or other evidence of otter were recorded during the 2012 or 2019 field surveys.
- 7.90 The watercourses within the site are variable in their size and characteristics. Many of these watercourses provide suitable commuting habitat for otter within their wider territory range, and supporting otters, for foraging, commuting and sheltering purposes. The banks are fringed by dense bankside vegetation, with overhanging peaty banks and other cavities, creating opportunities for otter to utilise the habitats within the site for resting up and permanent shelter.
- 7.91 Atlantic salmon and brown trout fry and parr were identified during 2012 electrofishing surveys undertaken for the consented development. The Dorback Burn and the tributaries around Cairn Duhie were found to support good populations of salmon and trout which offer a foraging resource for otter.

Water Vole

- 7.92 No records of water vole were returned by the desk study. No burrows or other evidence of water vole were recorded during the 2012 or 2019 field surveys.
- 7.93 The site offers some sub-optimal habitat for water voles. Unnamed tributaries with the site have a low flow offering suitability for water vole commuting. The areas of exposed bank offer burrowing habitat for water vole, and rush and grassland habitats along banksides offer suitable foraging habitat. Although no evidence of water vole was identified during the surveys, it is possible that the species could colonise the site. There are records of American mink, which is a predator of the species, within 5km of the site, which may limit the suitability of the site for a sustainable population of water vole.

Badger

- 7.94 No records of badger were returned by the desk study. In surveys undertaken for the consented development in 2012, two sett complexes were identified outwith the site to the north which, whilst not in current use by the species, may have been historically occupied, or if in use, only be periodically used as badger outlier setts.
- 7.95 No evidence of badger was recorded within the site during the 2019 field surveys. One badger sett with a single D-shaped entrance was identified outwith the site to the north in an area of broom (*Cytisus scoparius*) (see Appendix 7.2 and Figure 7.5). Further entrances may be present around this sett entrance and further north outwith the site, although access permissions and restrictions prevented survey of this area. Badger paths were noted leading along an adjacent fence line and into an area of birch woodland, and foraging signs were also noted in this area in the form of badger snuffle holes (see Appendix 7.2 and Figure 7.5).

²⁷ Scottish Biodiversity List (2013). Available at: <https://www.nature.scot/scotlands-biodiversity/scottish-biodiversity-strategy/scottish-biodiversity-list>.

²⁸ UK BAP Habitats. Available at: <http://jncc.defra.gov.uk/page-5718>.

7.96 The majority of the site is considered unsuitable for badger due to the presence of wet, peat-dominated substrate. More suitable foraging areas were identified the grassland in the north as this habitat supports invertebrates such as earthworms which are a key component of the badger diet. Well-connected woodland edge habitat outwith the site to the north also allows for sheltered commuting outwith the site.

Pine Marten

7.97 No records of pine marten were returned by the desk study. No dens or other evidence of pine marten were recorded during the 2012 or 2019 surveys.

7.98 The site offers limited suitable habitat for the species due to it being open and lacking areas of mature, well connected forestry. Small patchy areas of immature broadleaved woodland are present within the site, however these are isolated and do not offer suitable habitat for the species. This habitat is likely to become more suitable to pine marten as the woodland matures. Pine marten will use open habitats within their home range for hunting prey species however these areas are less suitable for the species given the increased risk of predation in open spaces (MacPherson, 2014²⁹).

Red Squirrel

7.99 Numerous records of red squirrel within 5km of the site were returned by the desk study. No dreys or other evidence of red squirrel were recorded during 2012 or 2019 field surveys.

7.100 The site offers limited suitable habitat for the species due to it being open and lacking areas of mature, well connected forestry. Small patchy areas of immature broadleaved woodland are present within the site, however these are isolated and do not offer suitable habitat for the species. This habitat is likely to become more suitable to the species as the woodland matures. Red squirrel can also however use fungi, berries and tree buds as foraging resources, which were present in these areas. The remainder of the site is dominated by unforested habitats generally over peat of varying depths which are unsuitable for red squirrel.

Wildcat

7.101 No records of wildcat were returned by the desk study. No dens or other evidence of wildcat were recorded during the 2012 or 2019 surveys.

7.102 The majority of the site is considered unsuitable for wildcat due to the open nature of the habitat and lack of wooded and 'mosaic' habitats and edge habitats which provide shelter. Although wildcat will hunt in open areas, the presence of wet peat-dominated substrate is less suitable for small mammals species which offer prey to wildcat. There is a lack of suitable

denning habitat for the species including hollow trees and deadwood however some mammal burrows are present which could offer limited habitat.

Great Crested Newt

7.103 No records of GCN were returned by the desk study.

7.104 There is one area of standing water within the site (referred to as Pond 1 in Appendix 7.2), which has an HSI score of 'below average'. The HSI calculation for the pond is shown in Appendix 7.2, see also Figure 7.5 for the pond location. The pond is located within a geographical location which is unsuitable for GCN (O'Brien et al³⁰, 2017; Oldham, 2000).

Reptiles

7.105 Records of common lizard and slow worm were returned by the desk study, and common lizard and adder were recorded during surveys of the site in 2012. No reptiles or signs of reptiles were recorded during the 2019 field surveys.

7.106 The site offers suitable open grassland and peatland habitat for common lizard, slow worm and adder, on undulating ground. These species can utilise habitats such as these for basking, sheltering and foraging, as reptiles benefit from a diversity of microhabitats created by a variety of vegetation types (Edgar et al., 2010³¹). Peatland habitats can support small mammals, ground-nesting birds and invertebrates, all of which offer prey to reptiles (Catherine, 2018³²). Two potential hibernacula in the form of a large stone/boulder piles with covering vegetation were noted within the site (see Appendix 7.2 and Figure 7.5), as well as hummocks within the grassland habitats.

Bats

7.107 Bat survey field methods followed standard guidance at the time surveys were undertaken and are fully outlined within Appendix 7.3.

7.108 The desk study returned results of the following bat species within 10km of the site:

- Natterer's bat killed by a cat near Mid-Urchany (NH 9048) in 2018.

7.109 There are no buildings or stone wall structures within the site. All trees were surveyed for potential roost features (PRFs) for bats and none were identified.

7.110 Spatial bat activity surveys were conducted in the 2012 bat survey season, involving two walked transects surveyed across six monthly survey visits. In total three bat species and one genus classification were recorded during spatial surveys: soprano pipistrelle, common pipistrelle, pipistrelle spp. and Daubenton's bat, with a total of 1.54 bat passes per hour (bpph) recorded for the site (see Appendix 7.3).

²⁹ MacPherson, J. (2014). Feasibility Assessment for Reinforcing Pine Marten Numbers in England and Wales. Vincent Wildlife Pine Marten Recovery Project. The Vincent Wildlife Trust, Herefordshire.

³⁰ O'Brien, D., Hall, J., Miró, A., Wilkinson, J. (2017). Testing the validity of a commonly-used habitat suitability index at the edge of a species' range: great crested newt *Triturus cristatus* in Scotland. *Amphibia-Reptilia* 38: 265-273.

³¹ Edgar, P., Foster, J. and Baker, J. (2010). Reptile Habitat Management Handbook. Amphibian and Reptile Conservation, Bournemouth.

³² Cathrine, C. (2018). ARG UK Advice Note 10: Reptile Survey and Mitigation Guidance for Peatland Habitats. Amphibian and Reptile Groups of the United Kingdom.

- 7.111 Temporal (anabat) bat surveys were conducted in the 2012 bat survey season and four anabats were deployed during six monthly survey visits to record bat activity across the site over 29 nights (equivalent to 113 data recording nights - see Appendix 7.3) (see Figure 7.6 for anabat locations). No further temporal surveys have been carried out at the site, in agreement with SNH, as the existing data has been considered sufficient for the characterisation of the baseline conditions and to inform the assessment with respect to bats (Table 7.1).
- 7.112 In total, four bat species and one genus classifications were recorded within the study area during temporal bat surveys. Species recorded were common pipistrelle, soprano pipistrelle, Daubenton's bat and brown long-eared bat. Bat registrations identified to genus level were *Myotis* spp.
- 7.113 High collision risk species (as per SNH *et al.*, 2019) recorded onsite comprise soprano pipistrelle and common pipistrelle. All other bat species recorded are categorised as low collision risk (Daubenton's and brown long-eared bats).
- 7.114 The proposed development consists of 16 turbines which falls within the 'Medium' project size in line with guidance (SNH *et al.*, 2019) (see Appendix 7.3). In terms of habitat quality for bats, no features were found to have roost potential within the site. There are small burns of different sizes, providing connectivity throughout the site and the surrounding landscape. The habitat consists of open and exposed moorland with some small areas of birch woodland, which could be used by small numbers of foraging bats. Low quality forging habitat with no roosting potential within the site, results in a habitat category of 'Low' risk for bats, in accordance with SNH *et al.* (2019) (see Appendix 7.3).
- 7.115 The existing bat data was re-analysed using Ecobat (Mammal Society, 2017). The Ecobat output of temporal bat activity did not locate any bat registrations in proximity to the anabat locations within the maternity roost emergence times (Maternity period defined as 15th June - 30th July), which indicates that it is unlikely that a maternity roost is present within proximity of the turbines. The Ecobat output did locate bat calls outwith the maternity period before the upper time the species-specific emergence time range, and which therefore may potentially indicate the presence of a nearby roost for soprano pipistrelle at location 3 in May and September and for Daubenton's at location 4 in May.
- 7.116 Ecobat was used to gain estimates of relative bat activity recorded in 2012 at the site, and data was then evaluated in accordance with SNH *et al.*, (2019) guidance tables to determine overall site risk level. SNH *et al.*, (2019) explains that, "The tool compares data entered by the user with bat survey information collected from similar areas at the same time of year...Ecobat generates a percentile rank for each night of activity and provides a numerical way of interpreting the levels of bat activity recorded at a site across regions in Britain". Data from the site was compared with data within a range of 100km of the site and within 30 days of the survey date from all years (Appendix 7.3).
- 7.117 Table 7.9 presents the results of the Ecobat analysis for the site. The percentile is attributed to one of the following five bat activity categories as defined within SNH *et al.*, (2019): Low

(0-20%), Low-Moderate (20-40%), Moderate (40-60%), Moderate High (60-80%) and High (80-100%).

Table 7.9 - Percentile Bat Activity - Site Level

Bat Species	Median Percentile	Maximum Percentile	Nights Recorded (out of 113)
<i>Myotis</i> spp.	35	68	9
<i>Myotis daubentonii</i>	0	47	16
<i>Pipistrellus pipistrellus</i>	24	86	55
<i>Pipistrellus pygmaeus</i>	47	99	41
<i>Plecotus auritus</i>	0	0	3

- 7.118 The site has been categorised as a 'Low (level 2) Site Risk' to bats due to its 'Medium' project size and 'Low' habitat risk (see consideration within Appendix 7.3).
- 7.119 The risk assessment based on median percentiles for high collision risk species concluded a 'Low' risk for common pipistrelle and a 'Medium' risk for soprano pipistrelle. The overall site risk score based on maximum percentiles for high collision risk bat species is 'Medium' for both common and soprano pipistrelle species. At a finer scale this risk varies by anabat location, time of year, and species and this is highlighted in Figures 7.7 and 7.8 which show the risk at each anabat location per species and per month.
- 7.120 To provide an indication of how activity varied across the survey period for high collision risk species, in total, based on the median percentiles, it was calculated that 25% of the locations surveyed in May recorded a 'Medium' risk score, followed by June (25%), July (75%), August (50%) and September (25%). The highest percentage of 'Medium' risk scores recorded during the survey period was in July (75%). The maximum percentile scores which can be used to calculate peaks in bat activity, calculated a peak in activity during July and August with 100% and 75% of all locations surveyed recording a 'Medium' risk score, respectively (Figures 7.7 and 7.8).
- 7.121 No high risk locations were identified for common or soprano pipistrelle (Figures 7.7 and 7.8)
- Fish**
- 7.122 Surveys completed by the FNLFT (2012) for the consented development identified the Dorback Burn as a key tributary for Atlantic salmon and brown trout, with salmon fry only being recorded on the Dorback Burn and brown trout fry on all burns surveyed except the Stripe of Muckle Lyne and the Stripe of Little Lyne. Brown trout parr were recorded on all burns surveyed but Atlantic salmon parr were only recorded on the Dorback Burn. Second year Atlantic salmon were also only recorded on the Dorback Burn and second year brown trout adults were recorded on all but the Stripe of Little Lyne and Lyne Burn. Minnows (*Phoxinus phoxinus*) were also recorded on the upper Dorback Burn above Dava Bridge. All electrofishing survey points were offsite.

7.123 The survey demonstrated that the Dorback Burn and the tributaries around Cairn Duhie support good populations of salmon and trout. High numbers of trout fry in the Burn of Lochan Tutach suggests that this is an important spawning stream for trout. The River Findhorn (into which the Dorback Burn drains) supports an important salmon and sea trout fishery.

Other Species

7.124 Records of brown hare, mountain hare, common toad, common frog and palmate newt were returned by the desk study, but no evidence of these species was noted during the field surveys.

7.125 A fox (*Vulpes vulpes*) earth was recorded and evidence of fox was noted across the site. Several mammal holes and mammal paths were noted within the site however lack of field signs prevented confirmation of species usage.

7.126 No invasive non-native (INNS) plant species were recorded within the site or study area during the surveys. Records of American mink, within 5km of the site were returned by the desk study.

7.127 Deer were not observed during field surveys but are expected to be present locally and use the site periodically.

Future Baseline

7.128 In the absence of the proposed development, assuming the continuation of current land management practices, and allowing for changes in species behaviour related to climate change, the numbers and distribution of species are likely to continue to remain largely as they are, although natural fluctuations are likely to occur. The scattered broadleaved woodland will continue to mature and may encroach further into shallow peatland habitats in the longer term, and vegetation and habitat composition and extents may fluctuate in line with increasing or decreasing grazing in the long-term.

Implications of Climate Change

7.129 The 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), fluctuations on species behaviour and distribution is likely to occur at a local level, over time. However, the description of the baseline conditions remains robust and allows for an assessment of the impacts of the proposed development, during its lifespan, on ecology.

Cairn Duhie Wind Farm Design Considerations

7.130 As part of the iterative design process for the proposed development, ecological constraints identified through baseline survey results were considered to prevent or minimise adverse effects on ecological features (see Chapter 4: Development Description). This involved:

- A minimum 50m buffer for any infrastructure or construction activity around all watercourses. No watercourse crossings are required. The application of a 50m buffer will minimise effects on associated habitats and species.
- An 80m buffer from turbines to forest edge habitats in order to maintain a stand-off distance that ensures a minimum 50m buffer from turbine blade tip to feature height for all turbines, as recommended by SNH *et al.*, (2019) in relation to bats.
- Avoidance of deeper peatland (>1m depth) and Class 1 and Class 2 peatland for the location of turbines and other infrastructure as far as practicable.
- Avoidance of areas of potentially high GWDTE for the location of turbines and other infrastructure as far as practicable.
- Design of the track length and alignment to reduce the extent of track where practicable (see Chapter 4: Development Description) in order to minimise habitat loss.

Micrositing

7.131 Any micrositing of infrastructure within the proposed 50m allowance will be based on a review of existing ecological data and the completion of pre-construction surveys, to take into consideration the potential for direct encroachment onto protected species features, sensitive habitats or GWDTEs, or indirect alteration of hydrological flows supporting sensitive habitats or GWDTEs. Any micrositing will also take consideration of any buffer distances on protected features identified, as detailed within the SPP that will be developed following further pre-construction protected species surveys.

Likely Significant Effects

7.132 This section provides an assessment of the likely effects of the proposed development on the IEFs identified through the baseline studies. The assessment of effects is based on the project description outlined in Chapter 4: Development Description and is structured as follows:

- construction effects;
- operational effects; and
- cumulative effects.

Embedded Mitigation Measures

7.133 In addition to the design considerations detailed in paragraph 7.130, the following embedded mitigation measures are included in the assessment of otherwise unmitigated effects on IEFs:

- To ensure all reasonable precautions are taken to avoid adverse effects on habitats, protected species and aquatic interests, a suitably qualified ECoW would be appointed prior to the commencement of construction to advise the Applicant and the Contractor on ecological matters. The ECoW would be required to be present on the site during the construction phase and would carry out monitoring of works and briefings with regards to

any ecological sensitivities on the site to the relevant staff working for the contractor and subcontractors.

- A SPP will be implemented during the construction phase. The SPP will detail measures to safeguard protected species known to be in the area. Measures will include surveys in advance of construction activities and good practice methods during construction.
- Implementation of appropriate pollution prevention measures (particularly in relation to watercourses) and standard good practice construction environmental management will occur across the site as standard and form part of a robust Construction and Decommissioning Environmental Management Plan (CDEMP) - see Appendix 4.2.

Project Assumptions

7.134 The following assumptions are included in the assessment of otherwise unmitigated effects on IEFs:

- A 15-month construction phase is proposed and would include construction of access tracks, hardstandings, turbines and other infrastructure, and site restoration.
- All electrical cabling between the turbines and the associated infrastructure would be underground in shallow trenches which would be reinstated during the construction phase and, in all cases, follow the access tracks.
- The temporary construction compound, batching plant and borrow pit will be temporary infrastructure and will be restored following construction.
- Any disturbance areas around permanent infrastructure during construction would be temporary and areas reinstated or restored before the construction phase ends. The only excavation in these areas would be for cabling, as noted above, and otherwise would only be periodically used for side-casting of spoil until reinstatement.

Ecological Features Scoped out of this Assessment

7.135 In addition to those features already scoped out in paragraphs 7.10 to 7.12 above, with consideration of the desk-study information and baseline data collected, and following the embedded design mitigation and those measures described in the design layout considerations in paragraph 7.130 above, several further potential effects on IEFs can be scoped out of further assessment based on the professional judgement of the EIA team and experience from other relevant projects and policy guidance or standards. This includes effects from the construction and operational phases of the development as well as cumulative effects. The following paragraphs detail the ecological receptors and effects scoped out following surveys.

Habitats

7.136 Habitats within the site including acid grassland, conifer plantation woodland and dense/continuous scrub are of low conservation value and are common habitat types locally, regionally and nationally, and are therefore scoped out of the assessment.

7.137 Marshy grassland, which is rare within the site, is of the M23 and MG10a NVC types and is scoped out of the ecology assessment. M23 and MG10 are rush dominated habitats generally of low ecological value unless particularly species-rich examples are found. The M23 within

the site is not species-rich, often consisting of little more than a dense sward of rushes with occasional sedges. This is a common habitat type locally, regionally and nationally and there are no losses predicted at the site, as per Table 7.11 and Table 7.12. M23 is considered a potentially high GWDTE, and MG10 a potentially moderate GWDTE, however designation as a GWDTE does not infer an intrinsic biodiversity value, and GWDTE status has not been used as criteria to determine conservation value in the ecology assessment. There is however a statutory requirement to consider GWDTEs and the data gathered during the NVC surveys has been used to inform this assessment (see Chapter 9: Hydrology, Hydrogeology, Geology and Peat).

7.138 The following additional habitats are identified as IEFs of local importance at the site, some due to their listing as Annex I habitats or SBL Priority Habitats (Table 7.8), however they occupy such small areas within the site, they are species-poor examples, and any direct or indirect effects on the habitat either absent or so minor that all effects on them are scoped out of the assessment: broadleaved semi-natural woodland, acid dry dwarf shrub heath, wet modified bog, acid/neutral flush, basin mire, swamp and open water (see also Table 7.11 and Table 7.12 below).

7.139 Cumulative effects on blanket bog and wet dwarf shrub heath are scoped out, further details are provided in paragraph 7.220.

Protected Species

7.140 Effects on otter are scoped out of this assessment. The desk study confirmed presence of otter within 5km of the site. Some suitable habitat exists for foraging, commuting and resting otter, in and around watercourses within the site. No protected features in the form of holts or couches were recorded during the surveys although areas of suitable habitat exist for such features to be created. Given this information and the wide-ranging nature of otter, there will unlikely be any operational effects of the proposed development on otter. Effects on otter during construction will be limited to disturbance and/or indirect effects on habitat or food supply e.g. through watercourse pollution. The SPP will outline best practice measures and ensure that all reasonably practicable measures are taken so that the provisions of the relevant wildlife legislation are complied with in relation to otter during construction. Furthermore, pollution prevention measures will be implemented as part of the CDEMP during construction to ensure no adverse effects occur on watercourses. Thus, any direct or indirect effects on otter arising from the proposed development are considered negligible and are not considered further.

7.141 Effects on badger are scoped out of this assessment. No records of badger were returned by the desk study. No evidence of badger was recorded within the site during the field surveys. One badger sett with a single D-shaped entrance was identified outwith the site to the north, and paths and foraging evidence was also noted around this area. The majority of the site contains unsuitable or sub-optimal habitat for badger, being peat-based and wet with limited foraging resources. The badger sett and badger field evidence identified are located 740m and 730m respectively from the nearest proposed development infrastructure and as such, there will unlikely be any operational effects of the proposed development on badger. The

SPP will outline best practice measures and ensure that all reasonably practicable measures are taken so that the provisions of the relevant wildlife legislation are complied with in relation to badger during construction. Therefore, it is considered that potential effects on badger from the proposed development are negligible and are not considered further in this assessment.

- 7.142 Effects on water vole, pine marten, red squirrel and wildcat are scoped out of this assessment; some limited areas of habitat were considered suitable for these species, although there are no records of these species present within the site. Effects on GCN are also scoped out of this assessment due to the lack of local records of this species in the local area and the presence of poor suitability habitat within the study area.
- 7.143 The desk study confirmed the presence of common lizard, slow worm and adder, and the 2012 surveys recorded common lizard and adder. No reptiles were recorded during 2019 field surveys at the site. Reptiles are scoped out of the assessment and are mobile species capable of avoiding disturbance except during hibernation. The SPP will ensure that all reasonably practicable measures are taken during construction so that provisions of the relevant wildlife legislation are complied with in relation to these protected species, should any evidence be found during pre-construction surveys.
- 7.144 Effects on roosting bats are scoped out of the assessment. There are no buildings or stone wall structures within the site. All trees were surveyed for PRFs for bats and none were identified. Measures to reduce potential disturbance effects on bats will also be included within the SPP. Effects on foraging and commuting bats are assessed within this chapter.
- 7.145 Operational and cumulative effects arising from collision mortality on low collision risk bat species are scoped out of the assessment (SNH *et al.*, 2019). Low collision risk species present and recorded at the site are detailed in paragraph 7.113 above.
- 7.146 Effects on wider-countryside fisheries interests, standing water and running water are scoped out of this assessment. The presence of salmon and trout parr and fry was identified within the watercourses surrounding the site. A minimum 50m buffer for any infrastructure or construction activity will be applied around all watercourses (no watercourse crossings are required). Pollution prevention measures and a CDEMP will also be implemented during construction and operation of the proposed development to ensure no adverse effects occur from pollution or sedimentation.
- 7.147 Effects on deer are scoped out of this assessment. The desk study indicates that three deer species may be present locally. There is no deer fencing around the site and therefore deer may use and pass through the site uninhibited. The site is dominated by mixed open upland habitats including bog and heath habitats with localised wooded areas and scattered mature trees, with coniferous plantations occupying areas to the north which will provide a food source and shelter for deer. The site is also surrounded by areas of remote upland ground comprising a mix of large areas of open moorland habitats similar to those in and around the proposed development, which will provide suitable deer habitat and commuting corridors

should any deer be temporarily displaced from the site during construction. Any disturbance or displacement to deer, from construction activities, is not expected to create a deer welfare issue due to the suitability of surrounding land and its availability and accessibility. Due to the size and location of the proposed development, it is also considered that it will not pose a significant barrier to any local movements or migrations of deer. If during construction, deer are displaced from the site then there are still suitable migration routes around the proposed development which will not force deer into areas of risk, across public roads and thereby increasing the potential for road traffic collisions, or towards built-up areas. As a result of the size and location of the proposed development and the extensive suitable habitat and commuting corridors locally, no negative impacts on deer are predicted, and they are not considered further within this chapter.

- 7.148 Effects on IEFs during operation of the proposed development, except for bats, have been scoped out. Maintenance of the proposed development will involve vehicular access along the access tracks only, and any maintenance of turbines will be occasional, typically carried out by a small number of maintenance staff inside the turbines during normal working hours, this is unlikely to result in any operational effects on any other species or habitats.

Scoped-In IEFs

- 7.149 A summary of the Nature Conservation Value of the remaining IEFs identified within the site and surrounding area (as confirmed through survey results outlined above) which have been scoped-in to the assessment are given in Table 7.10, together with the justification for inclusion. These comprise blanket bog, wet dwarf shrub heath and high collision risk bat species.

Table 7.10 - Nature Conservation Value of Scoped in IEFs

IEF	Nature Conservation Value	Relevant Legislation & Justification
Blanket bog	Local	<p>Blanket bog is listed as an Annex I habitat in the Habitats Directive and is an SBL priority habitat.</p> <p>Blanket bog is present extensively across the study area covering 395.6ha and 59.61% of the site. The majority of the blanket bog present is M19 mire, with small areas of M17 and M20, with occasional sparse M2 and M3 bog pools (Tables 7.7 and 7.8).</p> <p>The SNH Carbon and Peatland Map classes areas of the peatland within the site as Class 1 peatland, with a small area of Class 2 peatland. The majority of site infrastructure avoids areas of Class 1 and Class 2 peatland (Figure 7.2). Class 1 and 2 peatlands taken together identify the 'nationally' important resource, with Class 1 areas 'likely to be of high conservation value'. It is recognised that this definition is not purely for nature conservation and so not directly applicable to evaluating purely the Nature Conservation Value of a peatland.</p> <p>Blanket bog within the site is not considered to be nationally or regionally important due to historical impacts from peat cutting and</p>

IEF	Nature Conservation Value	Relevant Legislation & Justification
		drainage. Therefore, blanket bog within the site is considered to be of Local value as many areas have been impacted historically and mire habitat of this, and better, quality is relatively widespread in the local area, which further reduces the relative value of this habitat within the site. The design of the proposed development has also sought to avoid the deeper and higher quality areas of peatland as far as practicable.
Wet dwarf shrub heath	Local	<p>Wet heath is listed as an Annex I habitat in the Habitats Directive and is part of the SBL upland heathland priority habitat.</p> <p>Wet dwarf shrub heath is present extensively across the study area covering 175.3ha and 26.41% of the site, appearing most dominant within the central area of the site. This habitat is all in the form of M15 <i>Trichophorum germanicum</i> - <i>Erica tetralix</i> wet heath. In general, M15 within the study area shares many of its floristics with the local bog communities and grades into these communities where the peat deepens. It often gives way to blanket mire on the flatter ground of the study area. Grazing, peat cutting and burning also have important effects on the floristics and structure of this community, and these historical practices have likely extended the coverage of M15 into formerly deeper and wetter peats that would likely have been blanket bog.</p> <p>Wet heath within the study area is considered of no greater than Local value due to its extent and quality. This type of habitat is widespread throughout the local area.</p>
Bats	Local	<p>Bats are listed on Annex II of the Habitats Directive, and fully protected through the Conservation (Natural Habitats &c.) Regulations 1994 (as amended) ('The Habitats Regulations'). They are also protected under The Wildlife and Countryside Act 1981 (as amended) and The Nature Conservation (Scotland) Act 2004 (as amended). Common pipistrelle, soprano pipistrelle, Daubenton's and long-eared bat are listed as species of principal importance for biodiversity conservation on the SBL.</p> <p>Low levels of activity of four bat species was confirmed in the site, two of these are considered high collision risk species (soprano pipistrelle and common pipistrelle) (Appendix 7.3). No bat roosts or potential bat roosts were recorded within the site.</p> <p>All bat species recorded in the study area are considered to have a favourable conservation status under Article 17 of the Habitats Directive and are listed as Least Concern under the IUCN Red List criteria.</p> <p>The Nature Conservation Value across the site is assessed to be Local for all bat species.</p>

7.151 Effects may include direct loss of habitat, e.g. derived from permanent land-take for infrastructure or temporary land-take for the land required to accommodate construction site compounds. Impacts on habitats can also be indirect through increased habitat fragmentation, or changes caused by pollution, or effects to supporting systems such as groundwater or water-table levels. Direct effects to protected species may include: loss of individuals, e.g. through mortality; loss of key habitat; disturbance of key habitats; displacement from key habitat; barrier effects preventing movement to/from key habitats; and general disturbance. Indirect effects on protected species may include loss or change to food resources; and fragmentation, degradation or alteration of key habitats, e.g. because of pollution or hydrological disturbance.

Predicted Construction Effects

7.152 The most tangible effect during the construction phase of the proposed development will be direct habitat loss due to the construction of new access tracks, turbines, hardstandings, laydown areas and a control/substation. Much of this infrastructure will be permanent, however the temporary construction compound, a batching plant and borrow pit will be restored at the end of construction.

7.153 There may also be some indirect habitat losses to wetland habitats due to drainage effects. For the purposes of this assessment, it is assumed that wetland habitat losses due to indirect drainage effects may extend out to 10m from infrastructure (i.e. in keeping with indirect drainage assumptions within the carbon calculator). It is expected that any indirect drainage effects will only impact wetland habitats such as blanket bog, wet modified bog, marshy grassland, flushes, wet heath, wet woodland, swamp and basin mire. No indirect drainage effects are expected to impact or alter the quality or composition of 'dry' habitats such as coniferous woodland, scrub, dry heath and acid grassland; as such only direct habitat loss applies to those habitats.

7.154 Table 7.11 below details the estimated relative losses expected to occur, by habitat type, for all new permanent infrastructure.

7.155 Temporary habitat losses due to the creation of the borrow pit, temporary construction compound and the batching plant have been calculated separately and are detailed in Table 7.12, as although the existing habitat will be lost, these areas will be restored at the end of the construction phase. However, the habitat type which results after restoration may not be the same as the original habitat type due to changes in topographical or hydrological conditions.

Construction Effects

7.150 This section provides an assessment of the likely effects of the construction of the proposed development upon the scoped-in IEFs.

Table 7.11 - Estimated Loss of Habitat for Permanent Infrastructure

NVC Community Code or Habitat Type ³³	Phase 1 Habitat Type ³⁴	Phase 1 Site Extent (ha)	Direct Habitat Loss per NVC (ha)	Direct Habitat Loss as a % of Phase 1 Type in Site	Direct & Indirect Habitat Loss per NVC (ha)	Direct & Indirect Habitat Loss as a % of Phase 1 Type in Site
W4	Broadleaved Woodland: Semi-Natural (A1.1.1)*	5.22	0.01	0.26	0.04	0.84
U5	Unimproved & Semi-Improved Acid Grassland (B1.1 & B1.2)*	16.86	0.03	0.16	As per direct loss	
H10	Acid Dry Dwarf Shrub Heath (D1.1)*	19.86	0.005	0.59	As per direct loss	
H9			0.11			
M15	Wet Dwarf Shrub Heath (D2)	175.30	1.18	2.51	3.39	7.27
M15a			0.004		0.01	
M15b			0.82		2.57	
M15c			2.39		6.77	
M17	Blanket Bog (E1.6.1)	395.60	0.44	1.25	0.94	3.43
M17b			0.12		0.42	
M19			2.07		6.31	
M19a			0.23		0.74	
M19b			2.01		4.94	
M19c			0.01		0.06	
M20			0.05		0.15	
M25a			0.19		1.11	
M6c	Acid/Neutral Flush (E2.1)*	13.32	0.03	0.22	0.14	1.06
Site Totals		663.65	9.71	1.46	27.31	4.12

Table 7.12 - Estimated Loss of Habitat for Temporary Infrastructure

NVC Community Code or Habitat Type ³³	Phase 1 Habitat Type ³⁴	Phase 1 Site Extent (ha)	Direct Habitat Loss per NVC (ha)	Direct Habitat Loss as a % of Phase 1 Type in Site	Direct & Indirect Habitat Loss per NVC (ha)	Direct & Indirect Habitat Loss as a % of Phase 1 Type in Site
W4	Broadleaved Woodland: Semi-Natural (A1.1.1)*	5.22	0.002	0.04	0.001	0.02
U5	Unimproved & Semi-Improved Acid Grassland (B1.1 & B1.2)*	16.86	0.004	0.02	As per direct loss	
H9	Acid Dry Dwarf Shrub Heath (D1.1)*	19.86	0.01	0.05	As per direct loss	
M15	Wet Dwarf Shrub Heath (D2)	175.30	0.83	1.95	1.25	2.49
M15b			0.09		0.22	
M15c			2.51		2.89	
M17	Blanket Bog (E1.6.1)	395.60	0.10	0.60	0.14	0.87
M17b			0.04		0.08	
M19			1.38		1.91	
M19a			0.03		0.02	
M19b			0.79		1.23	
M20			0.05		0.08	
M25a			Wet Modified Bog (E1.7)*		17.14	
M6c	Acid/Neutral Flush (E2.1)*	13.32	0.01	0.07	0.02	0.13
Site Totals		663.65	5.99	0.90	8.05	1.21

7.156 The following sections assess the effect of these losses for each IEF scoped-in.

Blanket Bog

7.157 **Effect:** Effects upon blanket bog habitats will be direct (through habitat loss) and indirect (through potential drying effects upon neighbouring bog habitats) occurring from the

³³ Only specific habitats, communities or features subject to habitat losses are presented within this table. Any habitats or communities not listed here are not subject to any predicted direct or indirect habitat losses.

³⁴ Effects upon habitats with a ‘*’ in Tables 7.11 and 7.12 have been scoped-out of the assessment due to the minor nature of habitat loss involved or their low Nature Conservation Value (i.e. not an IEF), as per the sections above.

construction phase into the operational phase. Direct loss will occur in areas where access tracks pass through this habitat type, or where infrastructure such as turbine foundations and hardstandings are sited on these habitat types. In addition, there may be indirect losses as a result of drainage around infrastructure (around 10m from infrastructure is assumed) and disruption to hydrological flows.

- 7.158 **Nature Conservation Value:** As per Table 7.10, blanket bog within the site is considered to be of Local value.
- 7.159 As detailed in Table 7.10 above and Figure 7.2, Class 1 and Class 2 carbon rich soils and priority peatland is present within the site and this is defined as a 'nationally' important resource by Scottish Planning Policy³⁵ for these attributes (carbon storage and priority peatland habitat). It is recognised that this definition is not purely for nature conservation and so not directly applicable to evaluating purely the nature conservation value of a peatland.
- 7.160 SNH guidance (SNH, 2015)³⁶ on spatial planning emphasises *"The location of a proposal in the mapped area does not, in itself, mean that the proposal is unacceptable, or that carbon rich soils, deep peat and priority peatland habitat will be adversely affected. The quality of peatland tends to be highly variable across an application site and a detailed assessment is required to identify the actual effects of the proposal"*.
- 7.161 Additionally, Scottish Planning Policy³⁷ explains that, *"Recognising the need for significant protection, in these areas wind farms may be appropriate in some circumstances. Further consideration will be required to demonstrate that any significant effects on the qualities of these areas can be substantially overcome by siting, design or other mitigation"*.
- 7.162 Therefore, the presence of Class 1 and Class 2 peatland does not preclude wind farm development. The state and quality of the peatland habitat has been discussed throughout this chapter and within Appendix 7.3, for instance historical evidence of degradation through the effects of peat cutting and drainage. Furthermore, peat depth surveys have been carried out at the site to facilitate a detailed assessment, appropriate siting, design and mitigation (see Chapter 9: Hydrology, Hydrogeology, Geology and Peat and associated Appendices and Figures respectively). Overall, the blanket bog in the site is not considered to qualify as Nationally important (for instance not meeting all the criteria for selection as a SSSI) nor Regionally important and thus a nature conservation value of Local is considered appropriate.
- 7.163 **Conservation Status:** Conservation Status of this habitat as assessed in the 2019 JNCC report by the UK under Article 17 on blanket bog³⁸ is 'Unfavourable - Bad' and 'Stable' at the UK level.

- 7.164 **Magnitude of Effect:** The UK has an estimated 2,182,200ha of blanket bog³⁸ of which around 1,759,000 to 1,800,000ha is in Scotland^{39,40} (approximately 23% of the land area)⁴⁰. The Highland Council (i.e. the council area in which the proposed development is situated) covers a land area of 2,565,700ha and the terrestrial environment is made up of large, open stretches of moorland and heathland including areas of semi-natural woodland.
- 7.165 Blanket bog is the most abundant and widespread habitat type at the site and covers 395.60ha (59.61%) of the site. The majority of this blanket bog is M19 mire.
- 7.166 Direct habitat loss for blanket bog is predicted to be 4.94ha due to infrastructure (Table 7.11) and up to an additional 2.38ha for temporary infrastructure (Table 7.12). This results in a potential total direct loss of 7.32ha, equivalent to 1.85% blanket bog habitat onsite. This direct loss is a small loss of this habitat type in the site, local and regional context.
- 7.167 In addition, there may be some indirect losses because of the zone of drainage around infrastructure (assumed to extend out to 10m from infrastructure as per above; but this is unlikely given the discussion below). If, in the unlikely scenario, indirect drainage effects are also fully realised out to 10m in all blanket bog areas then predicted losses increase to 13.58ha for permanent infrastructure and 3.45ha for temporary infrastructure. This is a total of 17.03ha or 4.3% of blanket bog within the site. This is still considered to represent a low spatial effect magnitude (see criteria within Table 7.3) on a common habitat type within the site as well as in the wider local area.
- 7.168 The distance of the effects of drainage on a peatland is highly variable and depends on various factors such as the type of peatland and its characteristics and properties of the peat; the type, size distribution and frequency of drainage feature; and whether the drainage affects the acrotelm, penetrates the catotelm, or both. Consequently, drainage effects can be restricted to just a few metres around the feature or extend out to tens of metres, or further (e.g. see review within Landry & Rochefort (2012⁴¹)). The hydraulic conductivity of the peatland is one of the key variables which affect the extent of drainage. In general, less decomposed more fibric peatlands (which tend to be found commonly in fen type habitats) generally have a higher hydraulic conductivity and drainage effects can extend to around 50m, whilst in more decomposed (less fibrous) peat drainage effects may only extend to around 2m. Blanket bog habitats commonly are associated with more highly decomposed peats (Nayak *et al.*, 2008⁴²).
- 7.169 Tracks on more than 1m depth of peat over appreciable areas of peatland will be floated, this will further reduce the potential effects of rockfill tracks acting as an open land drain in deeper peat in comparison to traditional cut and fill road construction. Guidance on floating

³⁵ <https://www.gov.scot/binaries/content/documents/govscot/publications/corporate-report/2018/11/peatland-and-energy-draft-policy-statement/documents/draft-peatland-and-energy-policy-statement/draft-peatland-and-energy-policy-statement/govscot%3Adocument/Draft%2Bpeatland%2Band%2Benergy%2Bpolicy%2Bstatement.pdf>

³⁶ SNH (2015). *Spatial Planning for Onshore Wind Turbines - Natural Heritage Considerations*.

³⁷ <https://www.gov.scot/publications/scottish-planning-policy/pages/6/>.

³⁸ <https://jncc.gov.uk/jncc-assets/Art17/H7130-UK-Habitats-Directive-Art17-2019.pdf>.

³⁹ <https://jncc.gov.uk/jncc-assets/Art17/H7130-SC-Habitats-Directive-Art17-2019.pdf>.

⁴⁰ <https://www.nature.scot/landscapes-and-habitats/habitat-types/mountains-heaths-and-bogs/blanket-bog>.

⁴¹ Landry, J. & Rochefort, L. (2012). *The Drainage of Peatlands: Impacts and Rewetting Techniques*. Peatland Ecology Research Group, Université Laval, Quebec.

⁴² Nayak, R.A., Miller, D., Nolan, A., Smith, P., Smith, J. (2008). *Calculating carbon savings from wind farms on Scottish peat lands - A New Approach*. <http://www.gov.scot/Publications/2008/06/25114657/0>

roads will also be followed during construction (FCE & SNH, 2010⁴³). For example, in peatland areas, intercepting ditches will only be created where deemed necessary and they are unlikely to be required on areas of flat bog. Where intercepting ditches are required, the preference will be for a 'flat ditch' excavated into the acrotelm only and avoiding deeper 'V-shaped' ditches that disrupt or penetrate the catotelm, as ditches excavated into the catotelm are more likely to lower the groundwater table locally. Track construction will also seek to maintain hydrological connectivity and flows throughout the site.

- 7.170 With the use of floating roads, the adoption of good practice and environmental management techniques, and an appropriate and considered drainage design, it is considered unlikely that indirect drainage effects of this scale (i.e. out to 10m either side of infrastructure) would occur or would have such an effect on the habitat as to result in large-scale vegetation shifts to a lower conservation value habitat type (such as acid grassland for example). For instance, Stewart & Lance (1991⁴⁴) in their study found that a lowering of the water table next to drains was slight and confined to just a few metres either side of the drain, on sloping ground the uphill zone of drawdown was even narrower. Subtle variations in plant species abundance was noted, with species dependent on high water-tables having a lower cover-abundance near to drains, and species with drier heathland affinities having higher cover than at places farther away. However, there were no wholesale changes in vegetation or the species assemblage; for instance, declines in Sphagna cover were highly localised and took nearly 20 years to achieve statistical significance.
- 7.171 It is considered very unlikely that any indirect drainage effects would have any notable effect on the type of bog present, or cause a change in the habitat type, as the majority of the bog continues to be active having withstood historical drainage and peat cutting; burning and grazing may also have occurred in the past. If drainage effects materialise locally around infrastructure the most likely effect will not be a major change in overall habitat type (i.e. bog) but rather a potential change in vegetation micro-topography, certain species cover, or abundance that may result in a subtle NVC community or sub-community shift to a relatively 'drier' type. If more severe drying effects are observed then blanket bog may transition to wet heath (NVC types M15 and/or M16). In extreme cases drying may result in the appearance of dry heath vegetation, although this is considered unlikely here. Wet and dry heaths are still habitats of conservation interest, being Annex I, UKBAP and SBL Priority Habitats also.
- 7.172 When considering the above minor habitat losses, and accounting for the relative abundance, distribution and quality of the blanket bog within the site as well as the wider area, an effect magnitude of **low spatial** and **long term temporal** is appropriate.

- 7.173 **Significance of Effect:** Given the above consideration of Nature Conservation Value, Conservation Status and Magnitude, the effect significance is considered to be **minor adverse** and **not significant** in the context of the EIA Regulations.

Wet Dwarf Shrub Heath

- 7.174 **Effect:** Effects are the same as those assessed for blanket bog (paragraph 7.157).
- 7.175 **Nature Conservation Value:** As per Table 7.10, wet dwarf shrub heath within the site is considered to be of Local value.
- 7.176 **Conservation Status:** Conservation Status of this habitat as assessed in the 2019 JNCC report by the UK under Article 17 on Northern Atlantic wet heaths with *Erica tetralix*⁴⁵ is 'Unfavourable - Bad' and 'Deteriorating' at the UK level.
- 7.177 **Magnitude of Effect:** The UK has an estimated 508,817ha of this wet heath type⁴⁵. The majority, around 340,000 to 400,000ha, is in Scotland⁴⁶.
- 7.178 Wet heath covers 175.30ha (26.41%) of the NVC study area and is all in the form of M15 *Trichophorum germanicum* - *Erica tetralix* wet heath (Table 7.8). M15 wet heath is very common and extensive across the site, it also forms large mosaic and transitional areas with blanket bog communities. M15 is present on both shallow peaty soils on sloping ground and on deeper peats where the former blanket bog has been degraded and the community floristics have shifted from bog to wet heath.
- 7.179 Direct habitat loss is predicted to be 4.39ha due to infrastructure (Table 7.11) and up to an additional 3.43ha for temporary infrastructure (Table 7.12). This results in a potential total direct loss of 7.82ha, equivalent to 4.46% of the wet heath habitats onsite. This direct loss is a minor loss of this habitat type in the local and regional context.
- 7.180 In addition, there may be some indirect losses because of the zone of drainage around infrastructure (assumed to extend out to 10m from infrastructure). If indirect drainage effects are fully realised out to 10m in all wet heath areas then predicted losses increase to 12.75ha for permanent infrastructure and 4.36ha for borrow pits. This is a total of 17.11ha or 9.76% of the wet heath within the site. This is still considered to represent a low spatial effect magnitude (see criteria within Table 7.3) on a common habitat type within the site as well as in the wider local area.
- 7.181 However, it is considered unlikely that indirect drainage effects would have a significant effect on the wet heath present or result in large-scale vegetation shifts to a lower conservation value habitat type, such as acid grassland for example. If drainage effects materialise then this could, depending on the degree of drying, result in some subtle shifts of community or vegetation type, and this would likely be shifts to other sub-communities within

⁴³ FCE & SNH. (2010). Floating Roads on Peat: A Report into Good Practice in Design, Construction and Use of Floating Roads on Peat with particular reference to Wind Farm Developments in Scotland.

⁴⁴ Stewart, A.J.A. & Lance, A.N. (1991). Effects of Moor Draining on the Hydrology and Vegetation of Northern Pennine Blanket Bog. *Journal of Applied Ecology* 28: 1105-1117.

⁴⁵ <https://jncc.gov.uk/jncc-assets/Art17/H4010-UK-Habitats-Directive-Art17-2019.pdf>.

⁴⁶ <https://jncc.gov.uk/jncc-assets/Art17/H4010-SC-Habitats-Directive-Art17-2019.pdf>.

- the M15 NVC community (e.g. from M15b to M15c or M15d) and may take many years to transition. In response to more severe drying effects than M15 wet heath would be expected over time to transition towards a dry heath community, such as the H9, H10 and/or H12 dry heaths already present at the site (Table 7.8). Dry heath here is considered to be of the same conservation value, and therefore overall it is unlikely there would be a decline in locally important habitat types due to any indirect drainage effects on wet heath.
- 7.182 When considering the above habitat loss, and accounting for the abundance, distribution and quality of the habitat within the site as well as the wider area, an effect magnitude of **low spatial** and **long-term temporal** is appropriate.
- 7.183 **Significance of Effect:** Given the above consideration of Nature Conservation Value, Conservation Status and Magnitude, the effect is considered to be **minor adverse** and **not significant** in the context of the EIA Regulations.
- Bats*
- 7.184 **Effect:** There is the potential for displacement and/or disturbance to foraging and commuting bats during the construction phase due to the construction of wind farm infrastructure and the minor woodland felling required to accommodate the infrastructure.
- 7.185 **Nature Conservation Value:** As per Table 7.10, all bat species within the site are considered to be of Local value.
- 7.186 **Conservation Status:** All bat species recorded in the site are considered to have a favourable Conservation Status⁴⁷.
- 7.187 **Magnitude of Effect:** In total, four bat species and one genus classifications were recorded during bat surveys. Species recorded were common pipistrelle, soprano pipistrelle, Daubenton's and brown long-eared bat. Bat registrations identified to genus level were *Myotis* spp. Much bat foraging and commuting activity typically occurs along edge features or edge habitat, such as along woodland edges, or along linear features such as watercourses.
- 7.188 In terms of habitat quality for bats, there are small burns of different sizes, providing connectivity throughout the site and the surrounding landscape. The habitat consists of open and exposed moorland with some small areas of birch woodland, which could be used by small numbers of foraging bats. Low quality foraging habitat with no roosting potential within the site results in the site being considered of low bat habitat suitability and quality (Appendix 7.3).
- 7.189 Turbines and infrastructure will be located within open areas however some limited felling and replanting of woodland and scattered trees is proposed for the construction of infrastructure. Despite the minor felling that will be undertaken, displacement or disturbance to foraging and commuting bats during construction is considered negligible given isolated nature of these habitats across the site making them less suitable for bats. New areas of native birch woodland will be planted to provide screening around the control building and substation compound. The total area of woodland to be felled is 0.27ha and the total which will be replanted is 1.4ha, therefore the overall abundance of woodland habitat will increase in the long term. Linear watercourse features are also largely avoided due to the 50m watercourse buffer for any infrastructure or construction activity.
- 7.190 Although some bat foraging or commuting behaviour may be slightly altered as a result of construction and minor woodland felling, an effect magnitude of **negligible spatial** and **short term temporal** is appropriate.
- 7.191 **Significance of Effect:** The effect significance is therefore considered to be **negligible** and **not significant** under the terms of the EIA Regulations.
- Proposed Mitigation**
- Habitats (Blanket Bog & Wet Dwarf Shrub Heath)*
- 7.192 No further mitigation, in addition to mitigation by design and those measures as described within paragraph 7.133 above, is proposed. Nonetheless, an OHMP (Appendix 7.4) has been included with the aim of maintaining and enhancing blanket bog and wet heath habitats at the site.
- Bats*
- 7.193 No further mitigation, in addition to mitigation by design and those measures as described within paragraph 7.133 above, is proposed.
- Residual Construction Effects**
- Habitats*
- 7.194 Residual effects on blanket bog and wet dwarf shrub heath during construction are considered to remain **minor adverse** and **not significant**. Although no significant effects are predicted an OHMP has been included to maintain and enhance blanket bog and wet heath habitats at the site, which in the longer term (i.e. through the operational phase, and beyond) will seek to deliver net positive ecological benefits to blanket bog and wet heath and reduce the effects to negligible, and potentially neutral or minor beneficial.
- Bats*
- 7.195 Residual effects on bats during construction are considered to remain **negligible** and **not significant**.
- Operational Effects**
- Predicted Operational Effects**
- 7.196 This section provides an assessment of the likely effects of the operation of the proposed development upon the scoped-in IEFs.

⁴⁷ <https://www.nature.scot/professional-advice/safeguarding-protected-areas-and-species/protected-areas/site-condition-monitoring/assessment-condition>

Habitats & Non-Avian Fauna

7.197 All likely direct and indirect effects on blanket bog and wet dwarf shrub heath have been considered in the Construction Effects section above. Indirect effects on habitats would largely occur during the operational phase as drying impacts take effect. However, such effects are likely to be minor/negligible and for ease and clarity of assessing effects on habitats these are considered together within the Construction Effects section above.

7.198 No further effects on any other IEF (with the exception of bats) are predicted during the operational phase.

Bats

7.199 **Effect:** During the operational phase, there is potential for collision risk upon commuting and foraging bat species, together with the risk that bats may be affected by barotrauma when flying in close proximity of the turbine blades. For the purposes of this assessment, the potential effects 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.

7.200 Research undertaken by Exeter University (DEFRA, 2016⁴⁸) found that most bat fatalities at UK wind farms have been common pipistrelle, soprano pipistrelle and noctule bats.

7.201 **Nature Conservation Value:** As per Table 7.10, all bat species within the site are considered to be of Local value.

7.202 **Conservation Status:** All bat species recorded in the site are considered to have a favourable Conservation Status³¹.

7.203 Further details on the Conservation Status of the high collision risk bats species recorded within the site are provided below.

7.204 Population estimates of common pipistrelle in 2013 were 1,390,000 in the UK and 352,000 in Scotland (JNCC, 2013)⁴⁹. In 2019, Article 17 of the UK Habitats Directive Report UK estimates the population range to be from 1,100,600 to 7,843,000⁵⁰, however a best single value has not been provided due to the uncertainty around the population estimate. Matthews *et al.*, (2018)⁵¹ provided a UK estimate of 3,040,000 for common pipistrelle; population estimates for Scotland were not provided.

7.205 Population estimates of soprano pipistrelle in 2013 were 774,000 in the UK and 198,000 in Scotland⁴². In 2019, Article 17 of the UK Habitats Directive Report UK estimates the population range to be from 2,024,000 to 8,563,000⁴³, however a best single value has not been provided

due to the uncertainty around the population estimate. Matthews *et al.*, (2018) provided a UK estimate of 4,670,000 for soprano pipistrelle; population estimates for Scotland were not provided.

7.206 **Magnitude of Effect:** Evaluating the vulnerability of a bat population to wind farms is based on three factors: activity level recorded, population vulnerability (determined by collision risk of species and population size) and site risk level. These factors are multiplied to generate an overall risk assessment score per species of either Low (0-4), Moderate (5-12) or High (15-25) (SNH *et al.*, 2019). Appendix 7.3 presents the results of this risk assessment for each high collision risk species and provides detailed results from the Ecobat analysis. Figures 7.7 and 7.8 also present the spatial and temporal risk categories for high risk species, based on the results of the monthly monitoring undertaken at locations across the site in 2012. A summary is provided below to inform the assessment.

7.207 Average site activity levels (median and maximum percentiles) were recorded for the following high collision risk bat species:

- Common pipistrelle: Low-Moderate (median) to High (maximum); and
- Soprano pipistrelle: Moderate (median) to High (maximum).

7.208 Due to having a 'high' collision risk and a 'common' population abundance rating, common and soprano pipistrelle bat are classified as having 'medium' population vulnerability. The site has been categorised as a 'Low' (level 2) site risk to bats due to its 'Medium' project size and 'Low' habitat risk (see Appendix 7.3 and paragraph 7.114).

7.209 The following overall risk assessment score for 'Median' and 'Maximum' percentiles was obtained in for the undernoted bat species.

- Common pipistrelle: Low (4) to Medium (10); and
- Soprano pipistrelle: Medium (6) to Medium (10).

7.210 The risk level varied between May and September with July and August being the months with greatest bat activity across the site (Appendix 7.3). Further context on each high collision risk species is provided below.

7.211 **Common pipistrelle:** No 'high' risk locations were identified within the site for common pipistrelle each month during May-September (Figure 7.7). Location 1 was a 'medium' risk location during May-August and Locations 3 and 4 were also 'medium' risk during July. Location 1 is within open moorland and locations 3 and 4 are within proximity to edge woodland and open water respectively. All other locations were of 'low' risk or returned no bat activity (Figure 7.7). An effect magnitude of **low spatial** and **long term temporal** is considered appropriate for common pipistrelle.

⁴⁸ DEFRA (2016). Understanding the Risk to European Protected Species (bats) at Onshore Wind Turbine Sites to inform Risk Management. University of Exeter.

⁴⁹ JNCC (2013). Individual Species Reports - 3rd UK Habitats Directive Reporting 2013. URL: <http://jncc.defra.gov.uk/page-6391>.

⁵⁰ Article 17 Habitats Directive Report 2019: Species Conservation Status Assessments (2019). Available at: <https://jncc.gov.uk/our-work/article-17-habitats-directive-report-2019-species/#regularly-occurring-species-vertebrate-species-mammals-terrestrial>. Accessed on: 03/06/2020

⁵¹ Mathews F, Kubasiewicz LM, Gurnell J, Harrower CA, McDonald RA, Shore RF. (2018) A Review of the Population and Conservation Status of British Mammals: Technical Summary. A report by the Mammal Society under contract to Natural England, Natural Resources Wales and Scottish Natural Heritage. Natural England, Peterborough.

7.212 **Soprano pipistrelle:** No ‘high’ risk locations were identified within the site for soprano pipistrelle each month during May-September (see Figure 7.8). Location 3 was a ‘medium’ risk location during July to September. Location 1 was also a ‘medium’ risk during August and Location 4 during July. Location 3 is close to edge woodland, Location 1 within open moorland and 4 is also within proximity to edge woodland. All other locations were of ‘low’ risk or returned no bat activity (Figure 7.8). An effect magnitude of **low spatial** and **long term temporal** is considered appropriate for soprano pipistrelle.

7.213 **Significance of Effect:** Given the above consideration of Nature Conservation Value, Conservation Status and Magnitude, the effect significance of collision risk on common and soprano pipistrelle bats is considered **minor adverse** and **not significant** in the context of the EIA Regulations.

Proposed Mitigation

7.214 No further mitigation, in addition to mitigation by design and those measures as described above within paragraph 7.133, is proposed.

Residual Operational Effects

7.215 Residual effects on bats during operation are considered to remain **minor adverse** and **not significant**.

Cumulative Effects

7.216 The primary concern regarding the assessment of cumulative effects is to identify situations where effects on habitats or species populations that may be non-significant from individual developments, are judged to be significant when combined with nearby existing or proposed projects that are subject to an EIA process. In the interests of focusing on the potential for significant effects, this assessment considers the potential for cumulative effects with other EIA developments. The main projects likely to cause similar effects to those associated with the proposed development are other operational wind farms, those under construction or those consented.

7.217 There are no other wind farms within 5km of the proposed development. Within 10km of the proposed development there are two operational wind farms (Berry Burn and Hill of Glaschyle) and one further which is awaiting determination following appeal/public inquiry (Clash Gour) (see Figure 5.1.6).

7.218 Wind farm projects at scoping stage have not been considered in the cumulative assessment because they generally do not have sufficient information on potential effects to be included, as the baseline survey period is ongoing, or results have not been published. Projects that have been refused or withdrawn have also not been considered.

7.219 Small projects with three or fewer turbines have also been excluded from the cumulative assessment as often these projects are not subject to the same level of detail of assessment, and so there are no directly comparable data. Because of the small scale of such projects, effects are likely to be negligible on the IEFs assessed.

Predicted Cumulative Construction Effects

Habitats

7.220 Blanket bog and wet dwarf shrub heath have been scoped-out of the cumulative assessment as it is considered unlikely that any significant ecological cumulative effects at a local or regional level will arise as a consequence of the proposed development adding to habitat loss associated with other projects (this applies to both the construction phase and also any limited drainage effects which may continue into the operational phase). This is due to the minor and low magnitude of losses of blanket bog and wet shrub dwarf heath predicted to occur due to the proposed development, as outlined above (Table 7.11 and Table 7.12). Additionally, application of the OHMP (Appendix 7.4) would mitigate direct and indirect habitat losses of blanket bog and wet heath as a result of the proposed development. No significant cumulative effects are therefore predicted on habitats (blanket bog and wet dwarf shrub heath); i.e. effects will remain **minor adverse** and **not significant**. With the application of the OHMP, residual effects on blanket bog in the longer term are considered to change to be neutral and potentially beneficial and not significant.

Bats

7.221 Cumulative displacement and/or disturbance effects on foraging and/or commuting bats during the construction phase have been scoped out given the negligible level of effects predicted and discussed within the Construction Effects section above. Furthermore, the two wind farms within 10km of the site are already operational, and as such there would be no cumulative displacement and/or disturbance effects during construction of the proposed development with these other wind farms.

Predicted Cumulative Operational Effects

Bats

7.222 Bats may be affected by cumulative wind farm developments because of the distances travelled by some species of foraging bat and the cumulative risks to bat populations as a result of barotrauma and/or collision with wind turbines during operation. High collision risk species recorded at the site were common and soprano pipistrelle.

7.223 Both common and soprano pipistrelle are widespread in Scotland, with distributions reaching into northern parts of Scotland. They are common species with large population sizes and lower population sensitivity or population risk (see Appendix 7.3 and SNH *et al.*, 2019). Pipistrelles also generally forage within 5km of their roosts (Avery, 1991⁵²).

⁵² Avery, M.I. (1991). Pipistrelle *Pipistrellus pipistrellus*. In: Harris S, Corbet GB (eds) The Handbook of British Mammals. Oxford University Press, Oxford, pp 123–128.

7.224 In consideration of the following information it is predicted any cumulative effects that may materialise as result of the proposed development are considered to be of **low spatial and long term temporal** magnitude:

- the low numbers of common and soprano pipistrelle bats recorded during bat surveys and the low-medium risk assessment scores for both species;
- the absence of any bat roosts within the site, the embedded mitigation with respect to buffer distances of turbines from forestry edges to minimise effects on commuting and foraging bats;
- the minor adverse and non-significant effect of the proposed development;
- the absence of any cumulative wind farm developments within 5km (i.e. within typical pipistrelle spp. foraging distances); and
- the low number of cumulative developments within 10km of the site and which are located in generally similar upland habitats.

7.225 **Significance of Effect:** Considering the above, cumulative effects on common pipistrelle and soprano pipistrelle bats are considered to be **minor adverse** and **not significant** in the context of the EIA Regulations.

Interrelationship between Effects

7.226 The potential effects of the proposed development are considered above in terms of effects on ecology as a discrete environmental topic. Indirect and secondary effects resulting from the interaction of direct effects arising both within a topic area and interrelated with other topics areas are also possible.

7.227 The potential interrelationship between direct habitat loss and effects on protected species has been accounted for in the Construction Effects section. Indirect effects to protected species may occur due to effects of habitat loss for prey items, but this is taken into account under the habitat loss assessment above.

7.228 Of the other topics with potential to affect ecological receptors, those effects identified in Chapter 8: Ornithology and Chapter 9: Hydrology, Hydrogeology, Geology and Peat are most likely to produce a measurable effect. Interrelated effects could potentially occur due to loss or reduction in quality of habitats via hydrological changes. These are already taken account of via the assessment of GWDTEs in Chapter 9: Hydrology, Hydrogeology, Geology and Peat. Changes to the ornithological assemblage as a result of the Proposed Development may also affect protected species, either as prey items or as competitors, but the level of change is likely to be negligible.

7.229 In summary, no significant interrelated effects in relation to ecology are predicted because of the Proposed Development.

Summary

7.230 There are no predicted significant effects on the IEFs assessed as a result of the proposed development during construction, operation, or cumulatively (see Table 7.13).

Table 7.13: Summary of Residual Effects

Likely Significant Effect	Mitigation	Means of Implementation	Residual Effect
Construction			
Blanket Bog and Wet Dwarf Shrub Heath - direct habitat loss from infrastructure and indirect loss as a result of drainage.	No specific mitigation proposed. General embedded mitigation proposed - pollution prevention measures, best practice construction methods and CDEMP. OHMP included for maintenance and enhancement of blanket bog and wet heath.	Pollution prevention measures, best practice construction methods and a CDEMP will be agreed with stakeholders prior to construction. The provision of a CDEMP would be required as condition of consent. An ECoW would oversee the construction phase and would be required as condition of consent. The final HMP will be agreed in advance of construction as part of a condition to the planning consent.	Minor Not Significant
Bats - displacement and/or disturbance to foraging and commuting bats.	No specific mitigation proposed. Good practice embedded mitigation in the form a SPP.	The provision of a SPP would be required as condition of consent. An ECoW would oversee the construction phase and would be required as condition of consent.	Negligible Not Significant
Operation			
Bats - collision risk and barotrauma to high collision risk species (common and soprano pipistrelle)	Embedded mitigation and maintenance of minimum stand-off distance of 80m between turbines and woodland edge features as per guidance (see paragraph 7.130).	Considered and implemented as part of the design process. Maintenance of the 80m buffer required during the operation phase to be undertaken by the Applicant and included within the SPP. The SPP would be required	Minor Not Significant

Likely Significant Effect	Mitigation	Means of Implementation	Residual Effect
		as condition of consent.	
Cumulative			
Bats - collision risk and barotrauma to high collision risk species (common and soprano pipistrelle)	Embedded mitigation and maintenance of minimum stand-off distance of 80m between turbines and woodland edge features as per guidance (see paragraph 7.130).	Considered and implemented as part of the design process. Maintenance of the 80m buffer required during the operation phase to be undertaken by the Applicant and included within the SPP. The SPP would be required as condition of consent.	Minor Not Significant

Chapter 8: Ornithology

8. Ornithology

Introduction

- 8.1 This chapter considers the potential effects of Cairn Duhie wind farm (hereafter referred to as the ‘proposed development’) on ornithology. It identifies and assesses the likely significant effects associated with the construction and operation of the proposed development as described in Chapter 4: Development Description. The specific objectives of the chapter are to:
- describe the ornithological baseline;
 - describe the assessment methodology and significance criteria used in completing the assessment;
 - describe and assess the potential effects, including direct, indirect and cumulative effects;
 - describe the mitigation measures proposed to address likely significant effects;
 - assess the residual effects remaining following the implementation of mitigation; and
 - provide details of any net gains proposed as part of a Habitat Management Plan (HMP).
- 8.2 Effects on habitats and non-avian fauna are addressed separately in Chapter 7: Ecology.
- 8.3 The assessment has been carried out by MacArthur Green and in accordance with accepted guidance (see paragraph 8.14). All staff contributing to this chapter have undergraduate and/or postgraduate degrees in relevant subjects, have extensive professional ornithological impact assessment and ornithology survey experience, hold professional membership of the Chartered Institute of Ecology and Environmental Management (CIEEM), and abide by the CIEEM Code of Conduct¹.
- 8.4 This chapter is supported by Appendix 8.1: Ornithology which contains the annexes listed below.
- Annex A - Legal Protection.
 - Annex B - Ornithological Survey Methodologies.
 - Annex C - Ornithological Survey Effort and General Information.
 - Annex D - Ornithological Survey Results.
 - Annex E - Collision Risk Assessments.
- 8.5 Confidential information relating to the breeding locations of protected bird species is provided in Appendix 8.2: Confidential Ornithology and Appendix 8.3: Habitats Regulations Appraisal (HRA) for Capercaillie and have limited distribution. Appendix 7.4: Outline Habitat Management Plan (OHMP) provides the scope of planned conservation management measures in relation to the proposed development, with the aims of providing benefits for key ornithological species.

- 8.6 Figure 8.1 to Figure 8.20, and Confidential Figure 8.2.1 are referenced in the text where relevant.

Planning

- 8.7 The following planning policy documents that are of particular relevance to the chapter are:
- Scottish Biodiversity Strategy: It’s in Your Hands (2004)/2020 Challenge for Scotland’s Biodiversity (2013);
 - Highland Council Biodiversity Duty Delivery Plan (2015/2017); and
 - UK Post-2010 Biodiversity Framework (2012).

Scope of Assessment

Effects Assessed in Full

- 8.8 This chapter considers the effects of construction and operation of the proposed development upon those ornithological features identified during the review of desk-based information and field survey data (the extents of the study areas are set out in paragraph 8.17). The following effects have been identified and are assessed:
- Direct habitat loss for birds through construction of the proposed development.
 - Displacement of birds through indirect loss of habitat where birds avoid the proposed development and its surrounding areas due to construction activities, turbine operation, maintenance and visitor disturbance. This also includes potential barriers to commuting or migrating birds due to the presence of the proposed development turbines and related infrastructure.
 - Habitat modification due to change in land cover (e.g. tree removal) or changes in hydrological regime and consequent effects on bird populations.
 - Death or injury of birds through collision with turbine blades, anemometer masts, or fences (if any) associated with the proposed development.
- 8.9 The chapter also assesses the potential for additional cumulative effects when considered in addition to other consented or proposed developments which are subject to Environmental Impact Assessment (EIA).

Effects Scoped Out

- 8.10 On the basis of policy guidance/standards (e.g. SNH 2018a²), any species that would be included in the categories detailed below have been scoped out of the assessment since significant effects are unlikely at a population level.

¹ <https://cieem.net/resource/code-of-conduct/>

² Scottish Natural Heritage (2018a) Assessing Significance of Impacts from Onshore Wind Farms Out-with Designated Areas.

- Common and/or species of low Nature Conservation Importance (NCI) not recognised in statute as requiring special conservation measures, i.e. birds not listed on Annex I of the EU Birds Directive³ or Schedule 1 of the Wildlife and Countryside Act 1981 (as amended).
- Common and/or species of low NCI not included in non-statutory lists that indicate birds whose populations are at some risk either generally or in parts of their range (e.g. the Birds of Conservation Concern (BoCC) Red list, Eaton *et al.* 2015⁴).
- Passerine species which are not generally considered to be at risk from wind farm developments (SNH 2017⁵, 2018a²) - with the exception being those that are particularly rare or vulnerable at a national level.

Assessment Methodology

Legislation, Policy and Guidance

Legislation and Policy

8.11 This assessment is carried out in accordance with the principles contained within the following legislation and policy.

- Directive 2009/147/EC on the Conservation of Wild Birds ('Birds Directive').
- Directive 92/43/EEC on Conservation of Natural Habitats and of Wild Fauna and Flora (as amended) ('Habitats Directive').
- Environmental Impact Assessment Directive 85/337/EEC (as amended).
- The Conservation (Natural Habitats &c.) Regulations 1994 (as amended) (The Habitats Regulations).
- The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017.
- The Nature Conservation (Scotland) Act 2004 (as amended).
- The Wildlife and Countryside Act 1981 (as amended).

Guidance

8.12 This assessment is carried out in accordance with the principles contained within the following documents.

- Planning Advice Note PAN 1/2013 - Environmental Impact Assessment (Scottish Government 2017).
- CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine version 1.1. Chartered Institute of Ecology and Environmental Management, Winchester.
- Eaton, M., Aebischer, N., Brown, A., Hearn, R., Lock, L., Musgrove, A., Noble, D., Stroud, D. and Gregory, R. (2015). Birds of Conservation Concern 4: The population status of birds in the UK, Channel Islands and Isle of Man. *British Birds* 108: 708-746.

- European Commission (2010). Natura 2000 Guidance Document 'Wind Energy Developments and Natura 2000'. European Commission, Brussels.
- Scottish Executive Rural Affairs Department (SERAD) (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.
- SNH (2000). Windfarms and birds: calculating a theoretical collision risk assuming no avoidance action
- SNH (2009). Environmental Statements and Annexes of Environmentally Sensitive Bird Information; Guidance for Developers, Consultants and Consultees.
- SNH (2011). Dealing with Construction and Breeding Birds.
- SNH (2013a). Avoidance Rates for Wintering Species of Geese in Scotland At Onshore Wind Farms.
- SNH (2013b). Geese and wind farms in Scotland: new information.
- SNH (2014, revised March 2017). Recommended Bird Survey Methods to Inform Impact Assessment of Onshore Wind Farms.
- SNH (2016). Assessing connectivity with Special Protection Areas (SPAs).
- SNH (2018a). Assessing Significance of Impacts from Onshore Wind Farms Outwith Designated Areas.
- SNH (2018b). Assessing the cumulative impacts of onshore wind farms on birds.
- SNH (2018c). Environmental Impact Assessment Handbook - Version 5: Guidance for competent authorities, consultation bodies, and others involved in the Environmental Impact Assessment process in Scotland.
- The Scottish Biodiversity List.
- The Highland Biodiversity Action Plan (2015 - 2020).

Consultation

8.13 In undertaking the assessment, consideration has been given to the scoping responses and other consultation undertaken as detailed in Table 8.1 below. During formal consultation (May 2013) for the previous Cairn Duhie wind farm assessment, SNH⁶ and the RSPB confirmed acceptance of the survey approach and extents, with the RSPB, the Highland Raptor Study Group (HRSBG) and the Forestry Commission all providing historical bird data.

Table 8.1: Consultation Responses

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action
The Highland		The presence of protected species such as Schedule 1 Birds must be included and	The potential effects on Schedule 1 bird species

³ Council Directive 2009/147/EC on the conservation of wild birds (the Birds Directive).

⁴ Eaton M.A., Aebischer N.J., Brown A.F., Hearn R.D., Lock L., Musgrove A.J., Noble D.G., Stroud D.A. and Gregory R.D. (2015). Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. *British Birds* 108, 708–746.

⁵ Scottish Natural Heritage (2014, revised March 2017) Recommended Bird Survey Methods to Inform Impact Assessment of Onshore Wind Farms.

⁶ Scottish Natural Heritage (SNH) changed its name to NatureScot at the end of August 2020; due to the timescales in which the Cairn Duhie EIA Report was drafted, these terms are used interchangeably within this chapter.

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action
Council (THC) 27/03/2020	Formal Scoping Consultation	considered as part of the planning application process.	have been considered in this chapter.
		An assessment of the impacts to birds through collision, disturbance and displacement from foraging, breeding or roosting habitat is required for both the proposed development and cumulatively with other proposals.	These potential effects have been considered in this chapter.
		The EIA Report should clearly state the survey methods used and provide sufficient justification from any deviations from guidance on ornithology matters.	Survey methodology is detailed in Appendix 8.1: Ornithology, Annex B. Direct consultation with SNH regarding the age and suitability of the baseline data is summarised below in this table.
		The EIA Report should provide a comprehensive baseline survey of bird interest on site.	A summary of baseline conditions is detailed per species below with further detail provided in Appendix 8.1: Ornithology and Confidential Appendix 8.2: Ornithology.
		It is expected that the EIA Report will address whether or not the development could assist or impede the delivery of elements of relevant Biodiversity Action Plans.	The Habitat Management Plan (Appendix 8.4) would focus on the restoration/improvement of blanket bog in two areas which in turn would provide benefits to black grouse, waders (curlew, lapwing, golden plover) and ground nesting raptors (hen harrier, merlin, short-eared owl).
		The EIA Report should address the likely impacts on the nature conservation interests of all the designated sites in the vicinity of the proposed development and provide proposals for any mitigation that is required.	A review of designated sites and potential connectivity is included within the Baseline Conditions section. Where there is considered to be potential for connectivity, information has been provided to allow the

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action
			competent authority to undertake and appropriate assessment in the context of the Habitats Regulations Appraisal (HRA) process.
East Nairnshire Community Council 17/03/2020	Formal Scoping Consultation	The reliance on the 2011-2012 ornithological data is insufficient to provide a robust assessment due to changing species diversity.	Direct consultation with SNH regarding the ornithological baseline has confirmed their agreement that there is sufficient data available to provide a robust assessment. The chapter considers the possibility of changes to the bird assemblage since baseline surveys, by taking a precautionary approach to the assessment of potential effects.
		Important but non-designated sites with important breeding populations have been omitted.	Refer to paragraph 8.44.
		Loch Kirkcaldy, while currently carrying no designation status, in an important overwintering and passage water for species such as whooper swans, goldeneye, teal and wigeon.	Noted, although it should be noted that as Loch Kirkcaldy is outwith the site and is over 1.2km from the nearest turbine, there is considered to be limited potential for disturbance-displacement as a result of the proposed development. Of these species, whooper swan were recorded during flight activity surveys and were included in the collision modelling (Table 8.7).
Scottish Natural Heritage (SNH)	Formal Scoping Consultation	Noted that there is potential for impacts upon internationally important features as the proposed development is less than 5km from the Darnaway and Lethen Forest Special Protection Areas (SPA) and	Refer to Confidential Appendix 8.3: Habitats Regulation Appraisal (HRA) for the detailed consideration of the

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action
03/04/2020		approximately 12km from Anagach Woods SPA, both designated for breeding capercaillie. As such, breeding capercaillie SPAs should not be scoped out of the EIA Report assessment.	capercaillie SPAs in the context of the HRA process. The findings of the HRA have also been summarised in the assessment sections below.
		Agreed on the inclusion of the Moray and Nairn Coast SPA, lying approximately 15km from the proposed development and designated for wetland birds, within the EIA Report.	Noted.
		Acceptable to scope out other designated sites within 10km of the proposed development as it is not considered that these sites will be directly or indirectly affected.	Noted.
SNH 16/06/2020	Specific Consultation on the Ornithological Baseline	Confirmed that given the survey information available, and in line with existing guidance, the approach and the use of the 2011-2012 baseline data as outlined in the Scoping Report is sufficient with regards to the ornithological baseline data.	Noted – refer to the Baseline Condition section for detailed review per species.
Royal Society for the Protection of Birds (RSPB) Scotland 17/03/2020	Formal Scoping Consultation	<p>The data for the breeding season is over 5 years old and does not align with SNH guidance. Survey work covering at least one more breeding season should be undertaken to enable a robust impact assessment.</p> <p>Consider that the baseline ornithology data available for the proposed development (Sept. 2011 – Aug. 2012, Dec. 2019 – March 2020) is not sufficient to conduct a robust impact assessment.</p>	<p>Direct consultation with SNH regarding the ornithological baseline has confirmed their agreement that there is sufficient data available to provide a robust assessment – justification is provided in paragraph 8.21.</p>
		There would be a likely significant effect on one or more SPA designated for capercaillie as the proposed development lies between several of these SPAs and all are within 20km of the site. Dispersing capercaillie (particularly hens) will travel over 30km and therefore, the proposed development site has potential connectivity to other SPAs within the	Refer to Confidential Appendix 8.3: Habitats Regulation Appraisal (HRA) for the detailed consideration of the Darnaway and Lethans Forest SPA in the context of the Habitats Regulations.

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action
		area such as Darnaway and Lethen Forest SPA, which lies to the north and Anagach Woods, and Craigmore SPAs.	It should be noted that during consultation on capercaillie as part of the previous Cairn Duhie wind farm, SNH concluded that <i>“There are other [capercaillie] designated sites of international importance in the area but, in our view, these will not be adversely affected by the proposal”</i> .
		An Appropriate Assessment of the effects of the proposal on the relevant SPAs in light of the site’s conservation objectives should be undertaken.	Noted, information is provided either within this chapter or in the supporting Appendices (8.1-8.3) to allow the competent authority to undertake an Appropriate Assessment.
Highland Raptor Study Group (HRSRG) 05/02/2020	Data Request	<p>Request for additional nesting data for raptors, owls and divers from 2012 to 2019.</p> <p>Response confirmed no golden eagle are nesting within 6km of the site.</p> <p>No response was received regarding other species.</p>	All available historic data fully considered in the assessment.
RSPB 30/06/2020	Data Request	Request for additional nesting data for raptors, owls, divers and capercaillie from 2012 to 2019.	Data provided for capercaillie.

Baseline Characterisation

Study Area

- 8.14 A range of surveys were employed to accurately record baseline ornithological conditions within the site boundary of the proposed development (the ‘site’) and appropriate survey buffers. Terms referred to are as follows:
- ‘survey area’ is defined as the area covered by each survey type at the time of the survey; and
 - ‘study area’ is defined as the area of consideration of effects on each species at the time of assessment, and as the area used for any desk-based study.
- 8.15 This chapter considers the study areas listed which are detailed on Figure 8.1, Figure 8.2 and in Appendix 8.1: Ornithology.

- Designated sites - proposed development and a 20km study area (SNH 2016⁷).
 - Scarce breeding birds - proposed development and a 2km study area (SNH 2017⁵).
 - Black grouse - proposed development and a 1.5km study area (SNH 2017⁵).
 - Breeding upland waders and wintering waders, raptors, owls and wildfowl - proposed development and a 500m study area (SNH 2017⁵).
 - Cumulative assessment - as per SNH (2018b⁸), the Natural Heritage Zone (NHZ) level is considered practical and appropriate for breeding species of wider countryside interest.
 - In-combination assessment - required as part of the HRA process, SNH (2016⁷) guidance has been consulted to identify an appropriate study area per SPA species scoped in to the assessment.
- 8.16 Following the completion of flight activity surveys, a Collision Risk Analysis Area (CRAA) was defined for the purposes of estimating possible rates of collisions with turbines. A wind farm area was created using Delaunay triangulation from the proposed turbine locations in Geographic Information System (GIS) software which was then buffered by 500m to create the CRAA (Figure 8.1). As recommended by SNH (2017⁵), using a larger area around the turbines accounts for possible inaccuracies in the recording of flightlines by surveyors, and records any species' flight activity that was in proximity to, but not necessarily within the wind farm area at the time of surveys.

Desk Study

- 8.17 The following data sources were considered as part of the assessment:
- SNH Sitelink (<https://sitelink.nature.scot/home>) for designated site information;
 - HRSRG for historic raptor breeding data;
 - RSPB Scotland for historic capercaillie data;
 - The Cairn Duhie Wind Farm Environmental Statement (ES) (2012) and associated Appendices (i.e. the 'consented development', consented July 2017); and
 - various EIA reports and monitoring documents for wind farm projects within NHZ 10: Central Highlands.

Field Surveys

- 8.18 The following surveys (following relevant survey guidance at that time, refer to Appendix 8.1: Ornithology, Annex B for detail of the survey methodologies) were undertaken at the site between April 2011 to August 2012 and December 2019 to March 2020:
- flight activity surveys (one breeding season and one non-breeding season), from three vantage points (VPs) (Figure 8.1);
 - breeding bird surveys (one breeding season), 500m survey buffer from site boundary (unchanged from previous submission);
 - winter walkover surveys (two non-breeding seasons), 500m survey buffer from site boundary (unchanged from previous submission);

- breeding raptor surveys (one breeding season), 2km survey buffer from site boundary (unchanged from previous submission);
- breeding diver surveys (two breeding seasons), 1km survey buffer from site boundary (unchanged from previous submission); and
- black grouse surveys (one breeding season), 1.5km survey buffer from site boundary (unchanged from previous submission).

- 8.19 Consultation regarding the available ornithological baseline information was undertaken with SNH in 2020, who did not raise any specific concerns relating to the age or scope of data. Repeat habitat surveys in 2019 have indicated that the habitats onsite are comparable with those identified in 2012 with the site continuing to be dominated by blanket bog and wet dwarf shrub heath (Chapter 7: Ecology). Consequently, with unchanged habitats and a continuation of similar land management practices, it is considered unlikely that there has been any substantial change to the species diversity present on the site since baseline surveys were undertaken. Furthermore, to ensure the robustness of the assessment, all available historic data have been considered.

Assessing Significance

Assessing Wider-Countryside Ornithological Interests

- 8.20 The evaluation for wider-countryside interests (interests unrelated to SPAs but including Sites of Special Scientific Interest (SSSIs) and Ramsar sites) has been made using the following process:
- Identifying the potential effects associated with the proposed development;
 - Considering the likelihood of occurrence of potential effects where appropriate;
 - Defining the sensitivity of a feature to effects via the Nature Conservation Importance (NCI) of the species present and establishing each population's conservation status;
 - Establishing the magnitude of the effect (both spatial and temporal);
 - Based on the above criteria, making a 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, suggesting measures to mitigate or compensate the effect where required; and
 - Considering residual effects after mitigation, compensation or enhancement.

Assessing the Likely Significant Effects on an SPA

- 8.21 The method for assessing the likely significant effects on an SPA is different from that employed for wider-countryside ornithological interests. The Habitats Directive is transposed into domestic legislation by the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended in Scotland). Regulation 48 includes a number of steps to be taken by the competent

⁷ Scottish Natural Heritage (2016) Assessing connectivity with Special Protection Areas (SPAs).

⁸ Scottish Natural Heritage (2018b) Assessing the cumulative impacts of onshore wind farms on birds.

authority before granting consent (these are referred to here as an HRA). 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 SPA (Regulation 48(1)(b)).
- if not, Step 2: consider whether the proposal (alone or in combination) is likely to have a significant effect on the SPA (Regulation 48(1)(a)).
- if so, Step 3: make an Appropriate Assessment of the implications for the SPA in view of that SPA's conservation objectives (Regulation 48(1)(a)).
- Step 4: consider whether it can be ascertained that the proposal will not adversely affect the integrity of the SPA ('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) and 48(6)).

8.22 It has already been established that the proposed development does not meet the criteria for Step 1. The results of baseline surveys and scientific conclusions presented in this chapter are therefore used to inform the HRA process, and potentially for the competent authority to conduct an Appropriate Assessment where likely significant effects have been identified.

Sensitivity Criteria

8.23 The sensitivity of the environmental features on or near to the site is assessed in line with best practice guidance, legislation, statutory designations and/or professional judgement.

8.24 Determination of the level of sensitivity of an Important Ornithological Feature (IOF) (CIEEM 2018⁹) to be taken forward for assessment is based on a combination of the feature's NCI and conservation status. Table 8.2 details the framework for determining the NCI of features, with IOFs those target species recorded during baseline surveys, identified to be of High or Medium NCI (CIEEM 2018⁹).

Table 8.2: Determining Factors of a Feature's NCI

Importance	Definition
High	Populations receiving protection due to inclusion as features of an SPA, proposed SPA, Ramsar Site, SSSI or which would otherwise qualify under selection guidelines. Species present in nationally important numbers (>1% national breeding population).
Medium	The presence of target 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 target species noted on the latest Birds of Conservation Concern (BoCC) Red list (Eaton <i>et al.</i> 2015 ⁴).

Importance	Definition
	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 wind farm. Species present in regionally important numbers (>1% regional breeding population).
Low	All other species' populations not covered by the above categories.

8.25 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" (SNH 2018a²).

8.26 Conservation status is considered to be favourable under the following circumstances (SNH 2018a²):

- "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 it likely to be reduced for the foreseeable future"; and
- "There is (and probably will continue to be) a sufficiently large habitat to maintain its population on a long-term basis".

8.27 SNH states that "an impact should therefore be judged as of concern where it would adversely affect the existing favourable conservation status of a species or prevent a species from recovering to favourable conservation status, in Scotland" (SNH 2018a²).

8.28 The relevant population scale for assessing potential effects on breeding species is considered to be the appropriate NHZ, in this case NHZ 10 Central Highlands. However, for some populations, insufficient information on the NHZ population may exist and, in these circumstances, the regional or national population estimate is used. For wintering or migratory species, the national or flyway population is considered to be the relevant scale for determining effects on the conservation status (SNH 2018a²) and this approach is used in this assessment.

Magnitude of Effect

8.29 An effect in this context is defined as a change to the abundance and/or distribution of a reference population as a result of the proposed development. Effects can be adverse, neutral or beneficial.

8.30 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.

8.31 Effects are judged in terms of magnitude in space and time, and the response of individual species to disturbance during relevant behaviours is considered when determining spatial and

⁹ Chartered Institute of Ecology and Environmental Management (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine, 3rd edition. CIEEM, Winchester.

temporal magnitude of effect and is assessed using guidance including Bright *et al.* (2006¹⁰), Hill *et al.* (1997¹¹) and Ruddock and Whitfield (2007¹²).

- 8.32 There are five levels of spatial and temporal effects as detailed in Table 8.3 and Table 8.4 below respectively. The examples given in these two tables provide a guideline to the assessment, but professional judgement will be relied upon in each individual case.

Table 8.3: Spatial Magnitude of Effect

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, displacement or disturbance. Guide: 21-80% of population lost through additive mortality.
Medium	Partial reduction in the status or productivity of a bird population due to mortality, 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, 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, displacement or disturbance. Reduction barely discernible, approximating to the 'no change' situation. Guide: <1% population lost through additive mortality.

Table 8.4: Temporal Magnitude of Effect

Temporal Magnitude	Definition
Permanent	Effect continuing indefinitely beyond the span of one human generation (taken as approximately 30 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 15-30 years (or longer, see 'Permanent').
Medium Term	Approximately 5-15 years.

Temporal Magnitude	Definition
Short Term	Up to approximately 5 years.
Negligible	Very minor (<6 months) or no temporal effect.

Significance Criteria

- 8.33 The predicted significance of the effect has been determined through a standard method of assessment based on professional judgement, considering both sensitivity (i.e. each bird species' relative sensitivity to a particular effect) and magnitude of effect. The significance criteria used in this assessment are listed in Table 8.5.

Table 8.5: Determining Significance of Effects

Significance of Effect	Description
Major	The effect is likely to result in a long term significant adverse effect on the integrity of a feature.
Moderate	The effect is likely to result in a medium term or partially significant adverse effect on the integrity of a feature
Minor	The effect is likely to adversely affect a feature 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 material effect. This is not a significant effect.

- 8.34 'Major' and 'Moderate' impacts are considered to be significant in the context of the EIA Regulations.
- 8.35 'Minor' and 'Negligible' impacts are considered to be not significant in the context of the EIA Regulations.

Cumulative Effects

- 8.36 The significance of cumulative¹³ effects is assessed following the same methodology as detailed above for the proposed development alone. The assessment follows SNH (2018b⁸) guidance for cumulative assessment.

Assessment Limitations

- 8.37 Limitations exist regarding 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

¹⁰ Bright, J. A., Langston, R. H. W., Bullman, R., Evans, R. J., Gardner, S., Pearce-Higgins, J. and Wilson, E. (2006) Bird Sensitivity Map to provide locational guidance for onshore windfarms in Scotland. RSPB Research Report No. 20.

¹¹ Hill, D. A., Hockin, D., Price, D., Tucker, G., Morris, R. and Treweek J. (1997). Bird Disturbance: Improving the Quality of Disturbance Research. *Journal of Applied Ecology*, 34: 275-288.

¹² Ruddock, M. and Whitfield, D. P. (2007) A Review of Disturbance Distances in Selected Bird Species. A report from Natural Research (Projects) Ltd to Scottish Natural Heritage.

¹³ When considering cumulative effects under the HRA process, the term 'in-combination' is used in place of 'cumulative'.

assessment. It should also be noted that whilst there have been various revisions to the design and site boundary across the proposed development life history, surveys across all the various seasons covered the study areas detailed on Figure 8.2 as a minimum.

- 8.38 It is acknowledged that the baseline data are over five years old and so a precautionary approach to the assessment has been undertaken, with all available historical data included and any potential changes to target species population distribution and abundance within the site, and at a national/NHZ 10 level taken into consideration.

Assessment Assumptions

- 8.39 The assessment below also makes the following assumptions.
- All felling/replanting will be executed as detailed in Chapter 4: Development Description.
 - All electrical cabling between the proposed turbines and the associated infrastructure will be underground in shallow trenches which would be reinstated post-construction and, in most cases, follow the proposed access tracks.
 - Any disturbance areas around permanent infrastructure during construction will be temporary and areas will be reinstated or restored before the construction period ends. The only excavation in these areas will be for cabling as noted above and otherwise may only be periodically used for side-casting of spoil until reinstatement.
 - Work on the proposed development, including vegetation clearance and construction of the site access tracks, turbine hardstandings and site compound and erection of the turbines is predicted to last for approximately 15 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 main breeding season of most birds at the site extends from March to August¹⁴. 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 a maximum of up to two breeding seasons. This, therefore, represents a worst-case scenario.

Baseline Conditions

- 8.40 The sections below provide information on statutory designations, a summary of flight activity survey results and a summary of results for each target species (grouped into species groups) recorded. For each target species recorded, it is also determined (based on baseline survey results and/or historic data) whether they can be reasonably scoped out of the assessment at this stage due to a lack of likely significant effects.

Designated Sites

- 8.41 Information gathered from the consultation exercise confirmed that there are no statutory designations within the site but that the proposed development would be located within 20km of seven statutory designations that include ornithological features (Figure 8.3).
- Darnaway and Lethen Forest SPA, approximately 4.4km to the north of the proposed development - breeding capercaillie;
 - Anagach Woods SPA, approximately 14.5km to the south-west of the proposed development - breeding capercaillie;
 - Moray and Nairn Coast SPA and associated Moray and Nairn Coast Ramsar, approximately 15.5km to the north of the proposed development - breeding osprey, and non-breeding bar-tailed godwit, dunlin, greylag goose, oystercatcher, pink-footed goose, red-breasted merganser, redshank, wigeon and waterfowl assemblage;
 - Loch Flemington SPA, approximately 18km to the north-west of the proposed development - breeding Slavonian grebe;
 - Craigmore Wood SPA, approximately 18km to the south of the proposed development - breeding capercaillie; and
 - Inner Moray Firth SPA and associated Inner Moray Firth Ramsar and Whiteness Head SSSI, approximately 18.5km to the north-west of the proposed development - breeding common tern and osprey, and non-breeding bar-tailed godwit, cormorant, curlew, goldeneye, oystercatcher, red-breasted merganser, redshank, scaup, teal and waterfowl assemblage.
- 8.42 In addition to reviewing designated sites, the desk study did not identify any Scottish Wildlife Trust reserves or National Nature Reserves within 20km of the site. One RSPB reserve (Culbin Sands) is over 15km to the north of the site and one Local Nature Reserve (Findhorn Bay) is over 17km to the north the site. Both of these reserves are situated in coastal/lowland habitats (in comparison to the site which is upland moorland) and so there is considered to be no scope for the proposed development to affect breeding at these sites.

Flight Activity Summary

- 8.43 A summary of all target species recorded during flight activity surveys at the site is detailed in Table 8.6. This summarises all flights observed during the baseline period (September 2011 to August 2012) regardless of the location of the flight in relation to the proposed development. For further details of the flight activity surveys, refer to Appendix 8.1: Ornithology.
- 8.44 Band *et al.* (2007¹⁵) describe a method of quantifying potential bird collisions with onshore turbines, in which: (i) the activity rate per unit area per season is extrapolated; (ii) the likelihood of a collision with a blade for a bird passing through the rotor swept area is calculated; and (iii) an 'avoidance rate' is applied to account for behavioural adaptation of

¹⁴ As per SNH breeding season dates for key breeding species in Scotland: <https://www.nature.scot/sites/default/files/2017-07/A303080%20-%20Bird%20Breeding%20Season%20Dates%20in%20Scotland.pdf>

¹⁵ Band, W., Madders, M., and Whitfield, D.P. (2007). Developing field and analytical methods to assess avian collision risk at wind farms. In: Janss, G., de Lucas, M. & Ferrer, M (eds.) *Birds and Wind Farms*. Quercus, Madrid. 259-275

birds to the presence of turbines. The bird seconds¹⁶ for target species identified to be ‘at-risk’¹⁷ were input into a collision risk model (using Band *et al.* 2007¹⁵) to calculate the predicted collision rates per season for each target species recorded during baseline flight activity surveys. A summary of the collision model results is detailed in Table 8.7 (refer to Appendix 8.1: Ornithology, Annex E for detailed results).

Table 8.6: Species Recorded During Flight Activity Surveys, September 2011 to August 2012

Species	Number of Flights Recorded	Total Bird Seconds ¹⁶ Recorded	Number of Flights Recorded ‘at-risk’ ¹⁷	Total Bird Seconds Recorded ‘at-risk’
Curlew	27	1,169	9	230
Goshawk	2	169	0	0
Greylag goose	57	108,479	20	14,577
Hen harrier	5	618	0	0
Lapwing	1	16	0	0
Merlin	1	62	1	23
Osprey	3	704	1	5.8
Oystercatcher	8	294	0	0
Pink-footed goose	6	56,075	5	21,529
Red-throated diver	1	90	0	0
Short-eared owl	6	614	1	149
Whooper swan	1	216	0	0

Table 8.7: Collision Modelling Results

Species	Non-Breeding Season	Breeding Season	Annual	Equivalent to One Bird Every X Years
Curlew	0.0065	0.0538	0.0602	16.6
Greylag goose	0.4242	0.0032	0.4274	2.3
Merlin	0.0037	0	0.0037	269.6
Osprey	0	0.0014	0.0014	699.9
Pink-footed goose	0.5819	0	0.5819	1.7

Species	Non-Breeding Season	Breeding Season	Annual	Equivalent to One Bird Every X Years
Short-eared owl	0	0.0318	0.0318	31.4

Black Grouse

8.45 Black grouse were identified to be lekking to the south-west of the site in 2012 (Figure 8.4) with a peak of six males recorded lekking. Individual females were also recorded during 2011/2012 winter walkovers, closer to the site boundary (Figure 8.4). Flight activity surveys did not record black grouse and therefore no collision risk is predicted.

8.46 The nearest known lek is 1.9km from the proposed development and so no disturbance or displacement would occur. Whilst black grouse are also at risk of colliding with structures close to the ground, such as fences and wires, with deer and stock fencing proving to be a particular hazard for this species¹⁸, embedded mitigation in the form of fence marking (paragraph 8.120) is proposed to ensure this potential risk is minimised. Pre-construction surveys and a Breeding Bird Protection Plan (BBPP) are also proposed in the embedded mitigation (paragraphs 8.118 and 8.119) which would ensure that any leks located are buffered by 750m during the construction phase.

8.47 Black grouse has remained on the BoCC Red list (Eaton *et al.* 2015⁴) due to an historical decline in the UK between 1800 and 1995, without substantial recent recovery. In Scotland the breeding range is contracting and numbers are declining, though the rate of decline varies regionally, being high in south western Scotland (-49%), but much smaller in the north east (-9%) which remains a stronghold for the species. Given what is known about the regional and national populations, it is considered that the level of black grouse activity recorded during 2011-2012 is likely to be representative of current species presence.

8.48 The HMP (Appendix 7.4) details improvements to blanket bog and wet heath which will also benefit foraging black grouse, in particular management unit B which is just over 750m from the lek and closer than the proposed turbine locations (Figure 7.9).

8.49 Considering the distance to the nearest lek, limited activity recorded onsite, no predicted risk of collision, the embedded mitigation and proposed habitat management, black grouse is scoped out of the assessment.

Raptors and Owls

Goshawk

8.50 Goshawk were confirmed to be breeding at one location (GI_1) to the north of the proposed development in 2012 (outwith the site boundary, 2.8km to the nearest turbine and 1.4km to

¹⁶ Bird seconds are calculated for each observation as the product of flight duration and number of individuals.

¹⁷ ‘At-risk’ is defined as: a flight having at least part of its duration (i) at potential collision height; (ii) within the CRAA; and (iii) recorded within the 2km viewshed of the associated VP.

¹⁸ [https://www.forestry.gov.uk/PDF/FCTN019.pdf/\\$FILE/FCTN019.pdf](https://www.forestry.gov.uk/PDF/FCTN019.pdf/$FILE/FCTN019.pdf)

the nearest infrastructure, Confidential Figure 8.2.1) with three chicks fledged. Goshawk were also recorded on two occasions during the 2019/2020 winter walkover surveys (once over the plantation to the north of the site and once commuting across the site to the north of the proposed turbines, Confidential Figure 8.2.1).

- 8.51 Flight activity surveys recorded two flights (Table 8.6, Figure 8.5, Appendix 8.1: Ornithology, Annex D), neither of which were identified to be 'at-risk' and therefore there is no predicted collision risk for goshawk.
- 8.52 There are an estimated 620 pairs of goshawk in Britain (Woodward *et al.* 2020¹⁹). The NHZ 10 population was estimated to be 12 (range 4-17) pairs in 2013 (Wilson *et al.* 2015²⁰). The goshawk population appears to be expanding in range in Scotland (Forrester *et al.* 2012²¹) and as the species is BoCC Green-listed, the national and regional/NHZ populations are likely to be in favourable conservation status. Given what is known about the regional and national populations, it is possible that goshawk breeding activity around the proposed development may have increased between 2011-2012 and 2020, however, considering that there is no suitable forest habitat within 500m of the proposed turbines, any additional breeding goshawk are unlikely to be displaced by the proposed development and as they primarily hunt in forest, the proposed development is considered unlikely to form part of the key foraging area for any breeding goshawk.
- 8.53 Nest site GI_1 is over 500m from any infrastructure related to the proposed development and so there is considered to be no potential for nest site disturbance. Additionally, goshawk are considered to be arboreal specialists and as there is limited tree cover within the site, the proposed development is not considered to be situated in key foraging habitat for this territory (supported by the very limited records of goshawk on the site). Considering this information and no predicted risk of collision, goshawk is scoped out of the assessment.

Hen Harrier

- 8.54 No evidence of breeding hen harrier was located within 2km of the site in 2012, and 2011/2012 and 2019/2020 winter surveys did not locate any evidence of roosting hen harrier within at least 500m of the site (in fact, with the exception of flight activity surveys, no hen harrier were recorded at all during baseline surveys). Consultation with the HRSG as part of the previous Cairn Duhie wind farm ES returned no evidence of breeding hen harrier within 2km of the proposed development.
- 8.55 Flight activity surveys recorded five flights (Table 8.6, Figure 8.6, Appendix 8.1: Ornithology, Annex D), none of which were identified to be 'at-risk' and therefore there is no predicted collision risk for hen harrier.

- 8.56 Hen harrier is Red-listed due to a historical decline in the UK, without substantial recent recovery. The regional NHZ 10 population was considered by Fielding *et al.* (2011²²) to be in unfavourable conservation status mainly due to persecution. In 2011, the NHZ 10 population was estimated to be 18 pairs (range 15-20, Wilson *et al.* 2015²⁰) and in 2018, the Scottish Raptor Study Group (SRSG)²³ recorded two pairs in west Moray, nine pairs in east Moray, and nine pairs in Badenoch & Strathspey, suggesting there may be some recent stabilisation in numbers. Given the relatively stable regional population trend, and similarity of habitat onsite, it is considered that the level of hen harrier activity recorded during 2011-2012 is likely to be representative of current species presence.
- 8.57 The HMP (Appendix 7.4) details improvements to blanket bog and wet heath which will also benefit foraging hen harrier (in particular management unit B, Figure 7.9) and encourage any activity away from the proposed turbines.
- 8.58 Pre-construction surveys and a BBPP are also proposed in the embedded mitigation (paragraphs 8.118 and 8.119) which would ensure that any nests located are buffered by 500m during the construction phase.
- 8.59 Considering the absence of breeding or roosting activity, and no predicted risk of collision, hen harrier is scoped out of the assessment.

Merlin

- 8.60 Merlin were recorded on two occasions during 2012 breeding raptor surveys (Figure 8.7) however no evidence of breeding merlin was located within 2km of the site in 2012 and consultation with the HRSG as part of the previous Cairn Duhie wind farm ES returned no evidence of breeding merlin within 2km of the proposed development.
- 8.61 Flight activity surveys recorded one flight (Table 8.6, Figure 8.8, Appendix 8.1: Ornithology, Annex D), which was identified to be 'at-risk', predicting an annual collision risk of 0.0037 or one every 269.6 years (Table 8.7, Appendix 8.1: Ornithology, Annex E).
- 8.62 Merlin is Red-listed due to a historical decline in the UK, without substantial recent recovery. The last national merlin survey (Ewing *et al.* 2011²⁴) suggested an overall stable population, albeit with regional differences in success, since the previous survey in 1993-94. The national survey recorded 66 breeding pairs in northeast Scotland in 2008, a reduction by 27% compared to the previous survey, so the regional/NHZ population is likely to have unfavourable status. The NHZ 10 population was estimated to be 13 pairs (range 7-21) in 2008 (Wilson *et al.* 2015²⁰). Given what is known about the regional and national populations, and unchanged conditions onsite, it is considered that the level of merlin activity recorded during 2011-2012 is likely to be representative of current species presence.

¹⁹ Woodward, I., Aebischer, N., Burnell, D., Eaton, M., Frost, T., Hall, C., Stroud, D.A. & Noble, D. (2020). Population estimates of birds in Great Britain and the United Kingdom. *British Birds* 113: 69–104.

²⁰ Wilson, M. W., Austin, G. E., Gillings S. and Wernham, C. V. (2015). Natural Heritage Zone Bird Population Estimates. SWBSG Commissioned report number SWBSG_1504. pp72. Available from: www.swbsg.org

²¹ Forrester, R.W., Andrews, I.J., McInerney, C.J., Murray, R.D., McGowan, R.Y., Zonfrillo, B., Betts, M.W., Jardine, D.C. and Grundy, D.S. (eds) (2012). *The [Digital] Birds of Scotland*. Scottish Ornithologists Club, Aberlady.

²² Fielding, A., Haworth, P., Whitfield, P., McLeod, D. & Riley, H. (2011). A Conservation Framework for Hen Harriers in the United Kingdom. JNCC Report 441. Joint Nature Conservation Committee, Peterborough.

²³ http://raptormonitoring.org/wp-content/uploads/2019/08/All-SRMS-Species_2018.pdf

²⁴ Ewing, S. R., Rebecca, G.W., Heavisides, A., Court, I.R., Lindley, P., Ruddock, M., Cohen, S. and Eaton, M.A. (2011). Breeding status of Merlins *Falco columbarius* in the UK in 2008. *Bird Study* 58: 379-389.

- 8.63 The HMP (Appendix 7.4) details improvements to blanket bog and wet heath which will also benefit foraging merlin (in particular management unit B, Figure 7.9) and encourage any breeding activity away from the proposed turbines.
- 8.64 Pre-construction surveys and a BBPP are also proposed in the embedded mitigation (paragraphs 8.118 and 8.119) which would ensure that any nests located are buffered by 500m during the construction phase.
- 8.65 Considering the absence of breeding activity and the negligible risk of collision, merlin is scoped out of the assessment.

Osprey

- 8.66 Osprey were recorded on two occasions during 2011 breeding bird surveys and three occasions during 2012 breeding raptor surveys (Figure 8.7) however no evidence of breeding osprey was located within 2km of the site in 2012 and consultation with the HRSG as part of the previous Cairn Duhie wind farm ES returned no evidence of breeding osprey within 2km of the proposed development.
- 8.67 Flight activity surveys recorded three flights (Table 8.6, Figure 8.9, Appendix 8.1: Ornithology, Annex D), of which one flight was identified to be 'at-risk', predicting an annual collision risk of 0.0014 or one every 699.9 years (Table 8.7, Appendix 8.1: Ornithology, Annex E).
- 8.68 Osprey is Amber-listed due to a previous Red-listed historical decline in the UK that was followed by a recovery based on an increase of at least 100% over 25 years or the longer-term period. The NHZ 10 population was estimated to be 8 pairs (range 4-12) in 2013 (Wilson *et al.* 2015²⁰) and the SRSG recorded 11 pairs in Inverness-shire and 17 pairs in Aberdeenshire in 2018²³. The national population has increased in the long-term (reflected in their recovered Amber status), and this is likely to be reflected in the NHZ population. Osprey nest in large (often emergent) trees or on purpose-built nest platforms and whilst the breeding population may have increased, there is considered to be limited suitable nesting potential within at least 500m of the proposed development and limited foraging opportunities within 2km of the proposed development (and no waterbodies within the site boundary).
- 8.69 Considering the likely absence of breeding activity, species' habitat preferences and the negligible risk of collision, osprey is scoped out of the assessment.

Peregrine Falcon

- 8.70 Peregrine falcon was recorded on one occasion during 2012 breeding raptor surveys (Figure 8.7) however no evidence of breeding was located within 2km of the site in 2012 and consultation with the HRSG as part of the previous Cairn Duhie wind farm ES returned no evidence of breeding peregrine falcon within 2km of the proposed development.
- 8.71 Peregrine falcon is Green-listed and are considered to be in favourable conservation status. The NHZ 10 population was estimated to be seven pairs (range 3-14) in 2014 (Wilson *et al.*

2015²⁰) although the SRSG recorded 11 pairs in Inverness-shire and 32 pairs in Aberdeenshire in 2018²³. Peregrine falcon nest on cliff faces or high man-made structures (e.g. bridges/towers) and whilst the regional breeding population may have increased, there is considered to be limited suitable nesting potential within 2km of the proposed development and it is therefore unlikely that the proposed development would form part of the core foraging range of any breeding pairs.

- 8.72 Conditions for this species are likely to be unchanged since baseline surveys and when considering the likely absence of breeding activity and no predicted collision risk, peregrine falcon is scoped out of the assessment.

Short-eared Owl

- 8.73 Short-eared owl were recorded outside of the site on three occasions during 2012 breeding raptor surveys (Figure 8.7) and whilst birds were suspected to be breeding in the wider area, no nests were located within 2km of the site in 2012. Consultation with the HRSG as part of the previous Cairn Duhie wind farm ES returned no evidence of breeding short-eared owl within 2km of the proposed development.
- 8.74 Flight activity surveys recorded six flights (Table 8.6, Figure 8.10, Appendix 8.1: Ornithology, Annex D), of which one flight was identified to be 'at-risk', predicting an annual collision risk of 0.0318 or one every 31.4 years (Table 8.7, Appendix 8.1: Ornithology, Annex E).
- 8.75 Short-eared owl is Amber-listed due to a moderate breeding range decline over 25 years/longer-term. The SRSG recorded two pairs in Aberdeenshire in 2018²³. Short-eared owl breeding numbers distribution can vary greatly between years, with pairs not showing any 'site faithfulness' between years and with breeding attempts linked to annual field vole population levels. Baseline surveys did record short-eared owl activity and so the data are likely to be representative of a year in which the species was present as a breeding species in the local area.
- 8.76 The HMP (Appendix 7.4) details improvements to blanket bog and wet heath which will also benefit foraging short-eared owl (in particular management unit B, Figure 7.9) and encourage any breeding activity away from the proposed turbines.
- 8.77 Pre-construction surveys and a BBPP are also proposed in the embedded mitigation (paragraphs 8.118 and 8.119) which would ensure that any nests located are buffered by 500m during the construction phase.
- 8.78 Considering the absence of breeding activity within the site, unchanged conditions since baseline surveys, and the negligible risk of collision, short-eared owl is scoped out of the assessment.

Divers

Black-throated Diver

- 8.79 A pair of black-throated diver was confirmed to be breeding (one chick fledged) 4.4km to the south of the proposed development in 2012 (outwith the site boundary, Confidential Figure 8.2.1). Black-throated divers were also recorded feeding on another loch south of the site boundary (Confidential Figure 8.2.1) and a single flight was observed over the site during the 2011 breeding wader survey (Confidential Figure 8.2.1).
- 8.80 There are no lochs/lochans within the site and the nearest suitable lochs are 1.2km to the south-west (Loch Kirkcaldy) and south (Lochan Tutach) of the nearest proposed turbine.
- 8.81 Considering the distance to the nearest known breeding loch, no records within 1km of the proposed development, the lack of waterbodies within the site and no evidence to show that the proposed development is situated under a regular flightpath for commuting black-throated diver, the species is scoped out of the assessment.

Red-throated Diver

- 8.82 No evidence of breeding red-throated diver was recorded within 2km of the Proposed Development. Non-breeding activity of red-throated diver was recorded to the south of the site with occasional flight activity over the proposed development (Figure 8.7).
- 8.83 Flight activity surveys recorded one flight (Table 8.6, Figure 8.11, Appendix 8.1: Ornithology, Annex D), which was not identified to be 'at-risk' and therefore there is no predicted collision risk for red-throated diver.
- 8.84 Considering the distance to the nearest lochs (paragraph 8.82), no evidence of breeding within 2km of the proposed development, the lack of waterbodies within the site, no predicted risk of collision and limited evidence to show that the proposed development is situated under a regular flightpath for commuting red-throated diver, the species is scoped out of the assessment.

Waders

Curlew

- 8.85 Breeding wader surveys in 2011 identified one curlew territory within 500m of the proposed development (Figure 8.12) with further territories beyond the 500m study area.
- 8.86 Flight activity surveys recorded 27 flights (Table 8.6, Figure 8.13, Appendix 8.1: Ornithology, Annex D), of which nine flights were identified to be 'at-risk', predicting an annual collision risk of 0.0602 or one every 16.6 years (Table 8.7, Appendix 8.1: Ornithology, Annex E).
- 8.87 Considering breeding activity within the site is based on 2011 survey data, and there may be some interannual variation, as a precaution, curlew is scoped in to the assessment as part of a breeding wader assemblage.

Golden Plover

- 8.88 Breeding wader surveys in 2011 identified three golden plover territories within 500m of the proposed development (with further territories beyond the 500m study area, Figure 8.12) and 2019/2020 winter walkover surveys recorded one flock of 30 birds (Figure 8.14), suggesting individuals may be present throughout the year.
- 8.89 Considering breeding activity within the site is based on 2011 survey data, and there may be some interannual variation, as a precaution, golden plover is scoped in to the assessment as part of a breeding wader assemblage.

Lapwing

- 8.90 Breeding wader surveys in 2011 did not identify any lapwing breeding activity within 500m of the proposed development (four lapwing territories were recorded outwith the 500m study area, Figure 8.12) and 2011/2012 winter walkover surveys recorded one single bird.
- 8.91 Flight activity surveys recorded one flight (Table 8.6, Figure 8.15, Appendix 8.1: Ornithology, Annex D), which was not identified to be 'at-risk' and therefore there is no predicted collision risk for lapwing.
- 8.92 Considering breeding activity is based on 2011 survey data, as a precaution, and there may be some interannual variation, lapwing is scoped in to the assessment as part of a breeding wader assemblage.

Wildfowl

Greylag Goose

- 8.93 Flight activity surveys recorded 57 flights (Table 8.6, Figure 8.16, Appendix 8.1: Ornithology, Annex D), of which 20 flights were identified to be 'at-risk', predicting an annual collision risk of 0.4274 or one every 2.3 years (Table 8.7, Appendix 8.1: Ornithology, Annex E).
- 8.94 Greylag goose were also recorded in flight during the 2011/2012 and 2019/2020 winter walkover surveys on a total of 11 occasions (seven of which are shown on Figure 8.14). Across all greylag goose records, flock size ranged from one bird to 280 birds with an average flock size of 18 birds.
- 8.95 Considering the regular activity recorded, predicted collision risk and the species' inclusion as a qualifying feature of the Moray and Nairn Coast SPA, greylag goose is scoped in to the assessment.

Pink-footed Goose

- 8.96 Flight activity surveys recorded six flights, totalling 470 individuals (Table 8.6, Figure 8.17, Appendix 8.1: Ornithology, Annex D), of which five flights were identified to be 'at-risk', predicting an annual collision risk of 0.5819 or one every 1.7 years (Table 8.7, Appendix 8.1: Ornithology, Annex E).

8.97 Pink-footed geese were also recorded in flight during the 2011/2012 and 2019/2020 winter walkover surveys on a total of 13 occasions (Figure 8.14). Across all pink-footed goose records, flock size ranged from one bird to 170 birds with an average flock size of 46 birds.

8.98 Considering the regular wintering activity recorded, predicted collision risk and the species' inclusion as a qualifying feature of the Moray and Nairn Coast SPA, pink-footed geese are scoped in to the assessment.

Whooper Swan

8.99 Flight activity surveys recorded one flight (Table 8.6, Figure 8.18, Appendix 8.1: Ornithology, Annex D), which was not identified to be 'at-risk' and therefore there is no predicted collision risk.

8.100 Considering the lack of waterbodies within the site, no predicted risk of collision and limited evidence to show that the proposed development is situated under a regular flightpath for whooper swan, the species is scoped out of the assessment.

Consideration of SPA Connectivity

8.101 As detailed in the Scoping Report and previous Cairn Duhie wind farm ES, for the Moray and Nairn Coast SPA (and associated Ramsar) there is only considered to be potential for connectivity between the SPA and the proposed development for greylag geese and pink-footed geese (qualifying features for their non-breeding populations), with all other qualifying features scoped out of the assessment on the basis of distance to site and likely foraging range (as per SNH 2016⁷).

8.102 The Moray and Nairn Coast SPA and Darnaway and Lethen Forest SPA conservation objectives are detailed below:

- 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 species within the site;
 - (c) Distribution and extent of habitats supporting the species;
 - (d) Structure, function and supporting processes of habitats supporting the species; and
 - (e) No significant disturbance of the species.

8.103 On a similar basis of distance (18.5km away at its closest) and the likely foraging ranges of species listed as qualifying features (SNH 2016⁷), the Inner Moray Firth SPA (and associated SSSI and Ramsar) is scoped out of the assessment, with no likely significant effects predicted.

8.104 As the proposed development is approximately 4.4km to the south of the Darnaway and Lethen Forest SPA, in response to a request from the Applicant on advice in relation to the previous

Cairn Duhie wind farm, it was concluded by SNH (letter dated 27th January 2014) that for capercaillie “*there is likelihood that birds will overfly the [proposed development] site when moving between them [the capercaillie SPAs - Darnaway and Lethen Forest, Craigmore Wood, Anagach Wood and Abernethy Forest]*” and SNH objected to the consented development until further information was provided to allow an appropriate assessment in the context of the HRA process. SNH thus advised that the following further information was required: “*An assessment of the likely use of the wind farm site as a passage between the capercaillie SPA’s [i.e. between Darnaway and Lethen Forest SPA and the other capercaillie SPAs located to the south of the site] and other suitable habitat to the north and south, the potential for birds overflying the site to collide with the turbines and the significance of any collision mortality for the nearby populations*”. SNH also concluded that “*There are other [capercaillie] designated sites of international importance in the area but, in our view, these will not be adversely affected by the proposal*”. Therefore, the HRA provided for the consented development (MacArthur Green, June 2014 and reissued as Confidential Appendix 8.3) focussed on the Darnaway and Lethen Forest SPA as requested by SNH. For this application, the HRA has been reviewed and updated to take account of any additional information for the years between 2014 and 2020 and is provided as Confidential Appendix 8.3 to allow for the competent authority to undertake an appropriate assessment with regards to the Darnaway and Lethen Forest SPA.

Summary of Scoped-in Important Ornithological Features (IOFs)

8.105 On the basis of the findings of the survey work undertaken, information and consultation from other relevant projects (most notably the consented development), and the professional judgement of MacArthur Green, the following target species recorded during the baseline survey period have been scoped out of the assessment since significant effects are unlikely at a population level:

- Raptors: goshawk, hen harrier, merlin, osprey and peregrine falcon.
- Short-eared owl.
- Black-throated diver and red-throated diver.
- Whooper swan.
- Black grouse.

8.106 The assessment is applied to those scoped in IOFs detailed in Table 8.8 of Medium and High NCI (Table 8.2) that are known to be present within the site or surrounding area (as confirmed through survey results and consultations outlined above).

Table 8.8: Scoped-in IOFs

Feature	NCI	Reason for Inclusion
Greylag goose	High	Moray and Nairn Coast SPA connectivity, migratory species.

Feature	NCI	Reason for Inclusion
Pink-footed goose	High	Moray and Nairn Coast SPA connectivity, migratory species.
Capercaillie	High	Darnaway and Lethen Forest SPA qualifying species.
Wader assemblage	Medium	Consists of one Annex I species (golden plover) and two BoCC Red-listed species (curlew and lapwing).

8.107 In addition, it is necessary to consider the conservation status of any scoped in IOFs and these are detailed in Table 8.9.

Table 8.9: Conservation Status of Scoped-in IOFs

IOF	Conservation Status	Information
Greylag goose	Schedule 1, BoCC Amber (WI, WL)	<p>The British population is estimated to be 230,000 individuals (2012/13 to 2016/17, Woodward <i>et al.</i> 2020¹⁹) wintering birds (in addition to the resident breeding population) with over 95% of the Icelandic population wintering in Scotland (Forrester <i>et al.</i> 2012²¹). Mitchell <i>et al.</i> (2010²⁵) estimates a north and west Scotland breeding (British) greylag goose population of 34,500 birds.</p> <p>The breeding (British) greylag goose population is considered to be in favourable conservation status with a marked 58% increase between 2004/05 and 2014/15²⁶. Forrester <i>et al.</i> 2012²¹ estimate the combined native and naturalised Scottish breeding population to be 25,000 birds.</p> <p>The wintering (Icelandic) greylag goose population is also considered to be in favourable conservation status with a 10% increase between 2004/05 and 2014/15²⁷.</p> <p>The Moray and Nairn Coast SPA population was estimated in wintering population was estimated to be 3,023 birds (1988/89 to 1992/93 winter peak mean²⁸). More recently, the population was assessed in March 2014 to be in unfavourable declining condition²⁸.</p>
Pink-footed goose	BoCC Amber list (WL)	<p>The British population is estimated to be 510,000 birds (2015/16, Woodward <i>et al.</i> 2020¹⁹). Mitchell and Hearn (2004²⁹) noted that pink-footed goose populations have increased greatly from the mid-1950s (20,000-30,000 birds) to mid-1990s (200,000-250,000 birds) and pink-footed goose has remained on the Amber list between the BoCC 3 (2009) and BoCC 4 (2015) reports. Overall, the wintering population is considered to be in favourable conservation status.</p>

IOF	Conservation Status	Information
		<p>The Moray and Nairn Coast SPA population was estimated in wintering population was estimated to be 7,538 birds (1988/89 to 1992/93 winter peak mean²⁸). More recently, the population was assessed in March 2014 to be in unfavourable declining condition²⁸.</p>
Capercaillie	Red list (BDMp ¹ , BDp ² , BDr ² , WDr ¹)	<p>Based on survey data collected during winter 2015/16³⁰, Scotland's capercaillie population was estimated to be 1,114 individuals. This is a slight decline (-13%) compared with the previous estimate of 1,285 individuals derived from the survey in 2009-10. Overall, it appears that the national population is relatively stable, at least over a short-term period. As in previous surveys, the area around Strathspey held the bulk of the population (83%) and capercaillie are now very scarce in Easter Ross, Moray, Aberdeenshire and Perthshire. Thus, the NHZ population is likely to be in unfavourable condition.</p> <p>The Darnaway and Lethen Forest SPA population was estimated to be 23 individuals in 1999-2003, with Anagach Woods SPA hosting 18 individuals in 2002-05, and Craigmore Wood SPA having 34 individuals at time of citation. Current numbers are unknown but based on evidence from the most recent survey, the SPAs are likely to be in unfavourable condition.</p>
Curlew	BoCC Red List (BDMp ¹ , BDp ²)	<p>The most recent national curlew population estimate recorded 68,000 pairs in 2009 (BTO BirdTrends³¹) and there has been a significant continued decline across Scotland, albeit the north east may have fared better than the large decline in density in the south west. The recent inclusion of the species on the BoCC Red-list suggests that the national and NHZ/regional populations are in unfavourable conservation status.</p> <p>The NHZ 10 population was estimated to be 811 (725-897) pairs in 2005 (Wilson <i>et al.</i> 2015²⁰).</p>
Lapwing	BoCC Red list (BDp ¹ , BDp ²)	<p>The national lapwing population was estimated to be 130,000 pairs in 2009 (BTO BirdFacts³²) and the Scottish population is estimated to be between 71,500 and 105,600 pairs (Forrester <i>et al.</i> 2012²¹).</p> <p>The BTO BirdTrends³¹ programme has reported a national decline by 43% across the UK, and 57 % in Scotland between 1995 and 2014. The BTO's map of change in relative density between 1994-96 and 2007-09 indicates that decreases have been the strongest in lowland regions and the south and that some increase may have occurred in some upland and northern regions of Britain. The NHZ trend is unknown but</p>

²⁵ Mitchell, C., Griffin, L., Trinder, M. & Newth, J. (2010). The population size of breeding greylag geese *Anser anser* in Scotland in 2008/09. Scottish Natural Heritage Commissioned Report No. 371.

²⁶ <https://monitoring.wwt.org.uk/our-work/goose-swan-monitoring-programme/species-accounts/british-greylag-geese/>

²⁷ <https://monitoring.wwt.org.uk/our-work/goose-swan-monitoring-programme/species-accounts/iceland-greylag-geese/>

²⁸ <https://sitelink.nature.scot/site/8550>

²⁹ Mitchell, CR & RD Hearn. 2004. Pink-footed Goose *Anser brachyrhynchus* (Greenland/Iceland population) in Britain 1960/61 – 1999/2000. Waterbird Review Series, The Wildfowl & Wetlands Trust/Joint Nature Conservation Committee, Slimbridge.

³⁰ <https://ww2.rspb.org.uk/community/ourwork/b/biodiversity/archive/2017/07/26/national-capercaillie-survey-2015-16.aspx>

³¹ BTO (2018) BirdTrends 2017: trends in numbers, breeding success and survival for UK breeding birds. <https://www.bto.org/about-birds/birdtrends/2017>

³² <https://app.bto.org/birdfacts/results/bob4930.htm>

IOF	Conservation Status	Information
		the regional and national populations are on balance likely to be in unfavourable conservation status.
Golden plover	BoCC Green List	<p>The UK golden plover breeding population is estimated to be 32,500-50,500 pairs (Woodward <i>et al.</i> 2020¹⁹), although Forrester <i>et al.</i> (2012²¹) give a Scottish breeding population estimate of 15,000 pairs, stating that this represents 80% of the British breeding population.</p> <p>The NHZ 10 population was estimated by Wilson <i>et al.</i> (2015²⁰) to be 2,702 (range 2,476-2,928) pairs in 2005.</p> <p>BTO BirdTrends³¹ states that the Scottish breeding population has shown slight long-term decline (-10%), although more recent trends over the last five and ten years have been positive (+18% and +1% respectively), and this is likely to be reflected in the regional/NHZ population, which is considered to be in favourable conservation status.</p>
<p>BoCC criteria (Eaton <i>et al.</i> 2015⁴) for Conservation Status:</p> <p>BDp = Breeding Population Decline. Severe decline in the UK breeding population size, of >50%, over 25 years (BDp¹) or the entire period used for assessments since the first BoCC review, starting in 1969 ("longer-term") (BDp²).</p> <p>BDMp = Breeding Population Decline. Moderate decline in the UK breeding population size, of more than 25%, over 25 years (BDMp¹) or the entire period used for assessments since the first BoCC review, starting in 1969 ("longer-term") (BDMp²).</p> <p>BDr = Breeding Range Decline. Severe breeding range decline over 25 years (BDr¹)/longer term (BDr²).</p> <p>BDMr = Breeding Range Decline. Moderate decline (by more than 25% but less than 50%) in the last 25 years (BDMr¹) or over longer term (BDMr²).</p> <p>WDr¹ = severe non-breeding range decline over 25 years.</p> <p>WL = Non-breeding localisation.</p> <p>WI = Non-breeding international importance.</p>		

Future Baseline

- 8.108 In the absence of the proposed development, it is likely that current land management practices (sheep grazing on upland moorland habitats) would continue. Allowing for some long-term species-specific changes in bird behaviour related to climate change (e.g. delayed, reduced or increased breeding attempts), and national population trends, the bird populations are in general likely to continue to be present in largely similar abundances and distributions to those described above in the Baseline Conditions section.

Implications of Climate Change

- 8.109 The 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), fluctuations on species behaviour and distribution is likely to occur at a local level, over time. However, the description of the baseline conditions remains robust and allows for an assessment of the impacts of the proposed development, during its lifespan, on ornithology.

Cairn Duhie Wind Farm Design Considerations

- 8.110 Breeding locations and key foraging locations of target species were taken into consideration from the early stages of the proposed development design process, to minimise the risk of disturbance, displacement and collision effects. This included the results of baseline surveys as well as longer-term datasets gathered from the HRSG and other sources.
- 8.111 In summary, the following steps have been taken in the design process to minimise the risk of significant effects on IOFs:
- avoidance of the recorded nesting location of goshawk by at least 500m;
 - avoidance of turbines and all new infrastructure by at least 500m of black grouse leks; and
 - consideration of larger turbine types with greater airspace between ground level and lower rotor top height above ground level, to minimise collision risks.

Micrositing

- 8.112 Any micrositing of infrastructure within the planned 50m tolerance will take into consideration the distances from historic and current nest sites of Schedule 1 breeding species and black grouse lek sites. No micrositing of infrastructure will encroach into species-specific disturbance-displacement buffers outlined in this chapter (following the recommended procedures of a Breeding Bird Protection Plan, BBPP).

Likely Significant Effects

- 8.113 This section provides an assessment of the likely effects of the proposed development on the IOFs scoped in to the assessment which considers the possibility of changes to the bird assemblage since baseline surveys, by taking a precautionary approach to the assessment of potential effects. The assessment of effects is based on the project description outlined in Chapter 4: Development Description and is structured as follows:
- construction effects - displacement through disturbance or direct habitat loss;
 - operational effects - collision risk;
 - operational effects - displacement; and
 - cumulative/in-combination effects.

8.114 For the purposes of the assessment, effects relating to capercaillie require consideration within the context of the Darnaway and Lethan Forest SPA and effects relating to greylag goose and pink-footed goose require consideration within the context of the Moray and Nairn Coast SPA via the HRA process. With regards to the HRA (as detailed above in paragraph 8.23), and as previously stated in paragraph 8.24, the proposed development is not directly connected to, or necessary for the management of, the SPA (Step 1) and it is considered likely to have a significant effect, either alone or in combination, on the SPA (Step 2). Step 3 therefore requires an Appropriate Assessment to be undertaken by the competent authority on the implications for the SPA's conservation objectives. This chapter provides information to inform the Appropriate Assessment, and a conclusion on the effects on the integrity of the SPA (Step 4).

Embedded Mitigation Measures

8.115 To ensure all reasonable precautions are taken to avoid negative effects on ornithological interests during construction, the Applicant will appoint a suitably qualified Ecological Clerk of Works (ECoW) prior to the commencement of construction and they will advise the Applicant and the Contractor on all ornithological matters (with the assistance of a suitably qualified/licenced ornithologist if required). The ECoW will be required to be present on the site during the construction period and will carry out monitoring of works and briefings with regards to any ornithological sensitivities on the site to the relevant staff within the Contractor and subcontractors.

8.116 A BBPP will be implemented during construction of the proposed development. The BBPP will detail measures to ensure legal compliance and safeguard breeding birds in the area and will include relevant guidance for Schedule 1 species and black grouse. The BBPP shall include good practice measures during construction.

8.117 Pre-construction surveys will be undertaken to check for any new breeding bird activity in the vicinity of the construction works. The ECoW (paragraph 8.117) will oversee the implementation of the above measures.

8.118 Any fencing erected within the site will be 'marked' using suitable materials to reduce the likelihood of black grouse collisions with fences (Trout and Kortland 2012³³).

Construction Effects

Predicted Construction Effects

8.119 The main potential effects of construction activities associated with the proposed development are the displacement and disruption of breeding, foraging or roosting birds as a result of noise and visual disturbance over a short-term period (either the duration of a particular construction activity within working hours, or the duration of the whole construction period - expected to be 15 months).

8.120 Effects on 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 impacts of 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 such as raptors, 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.* 1997¹¹).

8.121 Direct habitat loss would also occur due to the proposed development's construction, which would be both temporary (e.g. construction compounds, borrow pits etc) and long-term or permanent (access tracks and turbines). This has the potential to impact on breeding, foraging or roosting individuals.

Capercaillie

8.122 Capercaillie may be displaced from lekking, breeding, foraging or commuting habitat due to the effects of construction activities. As no evidence of capercaillie was recorded during baseline surveys, capercaillie are only assessed in the context of the Darnaway and Lethan Forest SPA and below is a summary of the detailed HRA information regarding capercaillie presented in Confidential Appendix 8.3: Habitats Regulation Appraisal (HRA).

8.123 Capercaillie were not recorded during baseline surveys and the results of the habitat surveys suggest minimal preferred capercaillie habitat present within the site with the general site landscape not considered suitable for roosting or lekking and with limited foraging suitability. At over 4km from the Darnaway and Lethan Forest SPA, it is considered unlikely that the adult breeding population will use the site and any effects are likely to be limited to dispersing birds (juveniles in particular) moving between subpopulations and the larger metapopulation.

8.124 Evidence (Confidential Appendix 8.3) suggests that some forested areas surrounding the site may provide potential 'stepping-stone' habitat for dispersing capercaillie, and are more likely to be used by any individuals moving between populations than the site itself (although direct flights through the site are possible). Regardless of exact route taken, evidence collated and expert opinion suggests that the frequency of such dispersal movements is however likely to be low, based on the unsuitable habitat within and to the south of the site, the low population in the wider area, and its associated low levels of productivity reducing the need for long-distance movement.

8.125 The likelihood of any individuals being significantly affected by construction activities is very low. Therefore, there are considered to be **no adverse effects on the integrity of the Darnaway and Lethens Forest SPA** under the HRA process (paragraphs 8.23 to 8.24 and paragraph 8.104) due to construction-related disturbance-displacement effects or direct habitat loss.

³³ Trout, R. and Kortland, K. (2012) Fence marking to reduce grouse collisions. Forestry Commission Technical Note.

Greylag Goose and Pink-footed Goose

- 8.126 **Effect - foraging displacement:** in a recent review, Olsson (2018³⁴) found that although there are large variations in responses of geese to disturbance among species, individual populations, seasons, sources and levels, disturbance effects on geese have generally been observed at distances up to 500m (see for example, Vickery and Gill 1999³⁵, Jensen *et al.* 2017³⁶).
- 8.127 Construction phase activities may therefore disturb birds from foraging areas located within 500m of the proposed development by virtue of increased activity resulting from the construction phase (mainly as a result of increased human activity).
- 8.128 Sensitivity:
- Greylag goose - high NCI (Table 8.8) and favourable conservation status (Table 8.9). Medium-high sensitivity. The Moray and Nairn Coast SPA population was assessed to be unfavourable declining as of March 2014.
 - Pink-footed goose - high NCI (Table 8.8) and favourable conservation status (Table 8.9). Medium-high sensitivity. The Moray and Nairn Coast SPA population was assessed to be unfavourable declining as of March 2014.
- 8.129 **Magnitude of Effect:** winter walkover surveys did not record any foraging geese within the 500m survey area and a review of data available from Mitchell (2012³⁷) on greylag goose and pink-footed goose foraging areas indicates that the nearest known foraging locations are over 4.5km from the proposed development, and mainly close to the coast and Moray and Nairn Coast SPA (Figure 8.19).
- 8.130 **Significance of Effect (EIA):** the unmitigated effect during construction on foraging geese is considered to be negligible at respective population levels, and is therefore **not significant** in the context of the EIA regulations.
- 8.131 **Significance of Effect (HRA):** based on the above considerations, there are considered to be **no adverse effects on the integrity of the Moray and Nairn Coast SPA** under the HRA process (paragraphs 8.23 to 8.24 and paragraph 8.104) due to construction-related disturbance-displacement effects.

Wader Assemblage

- 8.132 **Effect:** breeding and/or foraging curlew, lapwing and/or golden plover may be displaced from the site during construction, either by disturbance or direct habitat loss.

- 8.133 **Sensitivity:** medium NCI (Table 8.8) and unfavourable conservation status for curlew and lapwing (likely favourable for golden plover, Table 8.9) and therefore overall Medium sensitivity.
- 8.134 **Magnitude of effect:** one pair of curlew and three pairs of golden plover were identified within 500m of the proposed turbines. It should be noted that it is unlikely that all breeding wader activity would be entirely lost from the population during construction as there is additional suitable breeding habitat within and surrounding the site and it is more likely that any breeding waders that may have bred near the proposed turbine locations would be displaced to adjacent habitat.
- 8.135 Wilson *et al.* (2015²⁰) estimates a 2005 NHZ 10 breeding population of 811 breeding pairs of curlew and the potential (temporary) loss of one pair from the population as a result of the proposed development would therefore equate to a loss of 0.12% of the NHZ 10 population. As a worst-case (where breeding would be lost rather than displaced), an effect of negligible and short-term magnitude is predicted.
- 8.136 Wilson *et al.* (2015²⁰) estimates a 2005 NHZ 10 breeding population of 2,702 breeding pairs of golden plover, and so the potential (temporary) loss of three pairs from the population as a result of the proposed development would equate to a loss of 0.1% of the NHZ 10 population. As a worst-case (where breeding would be lost rather than displaced), an effect of negligible and short-term magnitude is predicted.
- 8.137 Lapwing were only recorded breeding over 500m from the proposed turbines and therefore any disturbance/displacement during construction is considered unlikely. An effect of negligible and short-term magnitude is predicted.
- 8.138 **Significance of Effect:** the unmitigated effect during construction for curlew, lapwing and golden plover is considered to be negligible and is therefore not significant in the context of the EIA regulations.

Proposed Mitigation

- 8.139 With no unmitigated significant effects predicted, no additional mitigation measures are required beyond those described in the Embedded Mitigation Measures section.

Residual Construction Effects

- 8.140 Given that no specific additional mitigation is required, the residual effects in relation to construction disturbance/displacement remain the same as considered in paragraphs 8.127, 8.132, 8.133 and 8.140, i.e. **not significant** within the context of the EIA Regulations, and **no adverse effect on the integrity of the Moray and Nairn Coast SPA or Darnaway and Lethen Forest SPA** under the Habitats Regulations.

³⁴ Olsson, C. (2018). Foraging and movement patterns by geese in agricultural landscapes. Swedish University of Agricultural Sciences, Uppsala.

³⁵ Vickery, J. A. & Gill, J. A. 1999. Managing grassland for wild geese in Britain: a review. *Biological Conservation*, 89, 93-106.

³⁶ Jensen, G. H., Pellissier, L., Tombre, I. M. & Madsen, J. (2017). Landscape selection by migratory geese: implications for hunting organisation. *Wildlife Biology*, 12.

³⁷ Mitchell, C. (2012). Mapping the distribution of feeding Pink-footed and Iceland Greylag Geese in Scotland. *Wildfowl & Wetlands Trust / Scottish Natural Heritage Report*, Slimbridge.

Operational Effects - Collision Risk

Predicted Operational Collision Risk Effects

- 8.141 Birds that utilise the airspace within the site at potential collision heights during the lifetime of the proposed development will be at risk of collision with turbines. The risk of collision with moving wind turbine blades may be related to various factors including the amount of flight activity over the site, the topography of the site, the species' behaviour, and the ability of birds to detect and manoeuvre around rotating turbine blades.
- 8.142 Collision risk modelling was undertaken as part of the baseline survey analysis (refer to paragraph 8.46, Table 8.7 and Appendix 8.1: Ornithology, Annex E) which results in a figure for the predicted collision rate at the proposed development which is then (for those IOFs identified) assessed within the context of the species' relevant populations to determine the significance of any losses.
- 8.143 **Effect:** birds flying within the turbine area may be subject to a collision risk with turbines or other infrastructure, thereby potentially affecting survival rates at a population level. For greylag goose and pink-footed goose, survival rates in relation to the Moray and Nairn Coast SPA populations, and for capercaillie in relation to the Darnaway and Lethen Forest SPA population, may also be affected and are considered below within an HRA context.

Capercaillie

- 8.144 No capercaillie activity was recorded within the site, and so no collision modelling was undertaken. The risk of collisions with turbines would be very low, although a theoretical collision risk may exist for dispersing individuals. Confidential Appendix 8.3: Habitats Regulation Appraisal (HRA) concluded that although capercaillie flights are typically at a low altitude and fast, they are capable of, and have been seen to, fly above the height of tree lines. It is likely that birds, under normal visibility conditions, would be able to avoid turbines at distance as they exit forested areas.
- 8.145 Evidence of collisions with structures such as deer fences and ski lift cables has been well documented in the literature and highlighted as a factor in species decline (Baines & Summer 1997³⁸, Watson & Moss 2008³⁹). It is therefore also possible that a collision risk may exist with static infrastructure, such as fencing, cables or buildings. The infrequency of dispersal flights and lack of suitable habitat across much of the site means that the risk of this is low, and so there are considered to be **no adverse effects on the integrity of the Darnaway and Lethens Forest SPA** under the HRA process (paragraphs 8.23 to 8.24 and paragraph 8.104) due to collision effects.

Greylag Goose

- 8.146 **Sensitivity:** medium-high.

- 8.147 **Magnitude of Effect:** greylag goose were the most frequently recorded species during baseline surveys, with a total of 57 flights recorded and an annual predicted collision risk of 0.4274 (or one bird every 2.3 years). Of these flights, the majority (50 flights) were recorded during the non-breeding season (1st September to 14th May for geese, Appendix 8.1: Ornithology, Annex E) with a non-breeding season predicted collision rate of 0.4242 (or one every 2.4 non-breeding seasons). To provide a 'worst-case' scenario, all greylag goose flights recorded during the non-breeding season have been considered to be part of the migratory population (and therefore part of the Moray and Nairn Coast SPA wintering population), however it is likely that at least some of the wintering flights are local winter movements of resident birds - of the 50 flights recorded, 35 were of one to seven⁴⁰ birds with the remaining 15 flights of flocks of nine to 280 birds more likely to be winter movements of migratory greylag geese.
- 8.148 The British wintering population (no NHZ 10 population estimate is provided) is estimated to be at least 230,000 (Table 8.9) and the additional mortality due to collision would be an increase over the baseline annual mortality rate (0.276, BTO BirdFacts⁴¹) of 0.001%. This increase in baseline mortality is considered to be of negligible and long-term magnitude.
- 8.149 The cited Moray and Nairn Coast SPA wintering population was estimated to be 3,023 birds (1988/89 to 1992/93 winter peak mean²⁸) and the additional mortality due to collision would be an increase over the baseline annual mortality rate⁴¹ of 0.051%.
- 8.150 The remaining seven flights were recorded between 30th May and 21st June and were predominantly single or pairs of birds (with one flock of seven birds) and these records are considered to be part of the Scottish breeding population of greylag goose. Collision modelling predicted a breeding season collision risk of 0.0032 (or one bird every 312.1 years). The Scottish breeding population (no NHZ 10 population estimate is provided) is estimated to be at least 25,000 birds (Table 8.9) and the additional mortality due to collision would be an increase over the baseline annual mortality rate (0.276, BTO BirdFacts⁴¹) of 0.006%. This increase in baseline mortality is considered to be of negligible and long-term magnitude.
- 8.151 **Significance of Effect (EIA):** the unmitigated effect on the Scottish resident greylag goose population and Icelandic migratory population is considered to be negligible and is therefore not significant in the context of the EIA regulations.
- 8.152 **Significance of Effect (HRA):** based on the above information, there are considered to be no adverse effects on the integrity of the Moray and Nairn Coast SPA due to collision risks.

Pink-footed Goose

- 8.153 **Sensitivity:** medium-high.
- 8.154 **Magnitude of Effect:** pink-footed geese were recorded on six occasions during flight activity surveys with a non-breeding season predicted collision risk of 0.5819 (or one bird every 1.7 non-breeding seasons). The British wintering population (no appropriate NHZ 10 population

³⁸ Baines, D., and R. W. Summers (1997). "Assessment of bird collisions with deer fences in Scottish forests". Journal of Applied Ecology: 941-948.

³⁹ Watson, A., and R Moss (2008). "Grouse". New Naturalist Series, HarperCollins Publishing.

⁴⁰ This was the maximum flock size of breeding native/naturalised greylag geese recorded during the 2012 breeding season, Appendix 8.1: Ornithology, Annex D.

⁴¹ <https://app.bto.org/birdfacts/results/bob1610.htm>

estimate is provided) is estimated to be at least 510,000 birds (Table 8.9) and the additional mortality due to collision would be an increase over the baseline annual mortality rate (0.171 BTO BirdFacts⁴²) of 0.001%. This increase in baseline mortality is considered to be of negligible and long-term magnitude.

8.155 The cited Moray and Nairn Coast SPA wintering population is estimated to be 7,538 birds (1988/89 to 1992/93 winter peak mean²⁸) and the additional mortality due to collisions would be an increase over the baseline annual mortality rate⁴² of 0.045%.

8.156 **Significance of Effect (EIA):** the unmitigated effect on the Scottish non-breeding pink-footed goose population is considered to be negligible and is therefore not significant in the context of the EIA regulations.

8.157 **Significance of Effect (HRA):** based on the above information, there are considered to be no adverse effects on the integrity of the Moray and Nairn Coast SPA due to collision risks.

Wader Assemblage

8.158 **Sensitivity:** medium.

8.159 **Magnitude of Effect:** the majority of curlew activity was in the breeding season, with a predicted collision risk of 0.0538 (or one bird every 18.6 years) and it is likely this activity was mainly related to a breeding pair or pairs identified within the 500m buffer to the north of the proposed development. The additional mortality due to collisions would therefore result in a negligible increase over the NHZ 10 baseline mortality rate (0.264, BTO BirdFacts⁴³) of 0.013%. The increase in baseline mortality for curlew is considered to be of negligible and long-term magnitude.

8.160 No collision estimate was predicted for lapwing and golden plover (no at-risk flights recorded). As a worst-case, an effect of negligible and short-term magnitude is predicted.

8.161 **Significance of Effect:** the unmitigated effect on the regional lapwing and NHZ 10 curlew and golden plover populations is considered to be minor adverse and is therefore not significant in the context of the EIA regulations.

Proposed Mitigation

8.162 With no unmitigated significant effects predicted, no additional mitigation is required. The habitat improvements for waders, and blanket bog and wet heath in general, as proposed in the HMP (Appendix 7.4) will however encourage breeding wader activity away from the proposed turbine locations which will ensure collision risk is minimised.

Residual Operational Collision Risk Effects

8.163 Given that no additional mitigation is required, the residual effects in relation to collision risk remain the same as considered in paragraphs 8.147, 8.147, 8.153, 8.154, 8.158, 8.159, and 8.163, i.e. **not significant** within the context of the EIA Regulations, and **no adverse effect on the integrity of the Moray and Nairn Coast SPA or Darnaway and Lethen Forest SPA** under the Habitats Regulations.

Operational Effects - Displacement

Predicted Operational Displacement Effects

8.164 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. It is recognised that disturbance may occur due to maintenance activities throughout the operational phase, although since these are likely to be of shorter duration and smaller extent than construction activities, effects will be lower than those predicted for construction effects (refer to previous section).

8.165 Displacement away from operational turbines has been found to occur in a number of individual wind farm studies, although the effects vary considerably between sites and species. Devereux *et al.* (2008⁴⁴) showed that wind farms had no, or at most a minimal, effect on the local distribution of wintering farmland birds and across a range of breeding bird species but predominantly waders and passerines at upland wind farms, Pearce-Higgins *et al.* (2012⁴⁵) found no displacement effects on any bird species at operating wind farms, other than where such displacement had already occurred during construction, and for some species the effects during construction were reversed during operation with numbers returning to pre-construction numbers. Consistent with the findings of Pearce-Higgins *et al.* (2012⁴⁵), Hale *et al.* (2014⁴⁶) found no evidence of displacement due to wind turbines in breeding grassland songbirds. However, Sansom *et al.* (2016⁴⁷) suggested that breeding golden plovers may be affected by operational turbines up to 400m away.

8.166 A North American study of redheads (a type of duck) found that breeding numbers at ponds within the wind farm were reduced by 77% compared to the situation pre-construction despite a three-fold increase in breeding numbers in the area outwith but near to the wind farm (Lange *et al.* 2018⁴⁸), suggesting that breeding ducks largely avoided nesting within the wind farm area itself.

⁴² <https://app.bto.org/birdfacts/results/bob1580.htm>

⁴³ <https://app.bto.org/birdfacts/results/bob5410.htm>

⁴⁴ 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.

⁴⁵ Pearce-Higgins, J.W., Stephen, L., Douse, A. and Langston, R.H.W. (2012). Greater impacts of Windfarms on bird populations during construction than subsequent operation: results of a multi-site and multi-species analysis. *Journal of Applied Ecology* 49: 386-394.

⁴⁶ Hale, A.M., Hatchett, E.S., Meyer, J.A. and Bennett, V.J. (2014). No evidence of displacement due to wind turbines in breeding grassland songbirds. *Condor* 116: 472-482.

⁴⁷ Sansom, A., Pearce-Higgins, J. W. and Douglas, D. J. T. (2016), Negative impact of wind energy development on a breeding shorebird assessed with a BACI study design. *Ibis*, 158: 541–555. doi:10.1111/ibi.12364

⁴⁸ Lange, C.J., Ballard, B.M. and Collins, D.P. (2018). Impacts of wind turbines on redheads in the Laguna Madre. *Journal of Wildlife Management* 82: 531-537.

- 8.167 Pearce-Higgins *et al.* (2009⁴⁹) observed certain species experiencing localised population increases with proximity to wind farm infrastructure installations, so while some birds may be displaced locally, others may benefit from the introduction of new structures into the habitat, or some other consequence of construction. This finding was further supported by Pearce-Higgins *et al.* (2012⁴⁵) who reported significant increases in breeding numbers of skylarks and stonechats at wind farms.
- 8.168 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 have significant effects on populations (Drewitt and Langston 2006⁵⁰). This was also the conclusion from modelling of energy costs to those bird species most likely to be sensitive to barrier effects (large and long-lived breeding birds such as seabirds) by Masden *et al.* (2010⁵¹). Humphreys *et al.* (2015⁵²) concluded that the extent to which barrier and displacement effects have been differentiated between in the field is however highly debatable as both are manifested as a reduction of birds within the wind farm (Cook *et al.* 2014⁵³). It may be the case therefore that barrier effects during the breeding season have already been accounted for as displacement effects.

General Evidence of Displacement of Geese by Wind Farms

- 8.169 Rees (2012⁵⁴) reviewed evidence for behavioural responses of geese to wind farms in literature published up to early 2012. She concluded that there was insufficient evidence at that time to determine whether landscape-scale displacement of foraging geese occurred as a result of wind farms. However, she concluded that geese tend to avoid foraging within 100m of wind turbines, and that geese tended to alter flight direction when between 5km and 1km distant, to avoid entering wind farms and so may experience a barrier effect. This was confirmed by Plonczkier and Simms (2012⁵⁵), who used radar to track flights of geese near to an operational offshore wind farm, and concluded that geese showed very high macro-avoidance, over 94% of flocks adjusting their flight direction to avoid entering the wind farm.
- 8.170 Rees (2012⁵⁴) concluded that available evidence at that time was insufficient to assess the scale or extent of displacement of geese. Several detailed studies have however improved the evidence base. While Larsen and Madsen (2000⁵⁶) found that pink-footed geese tended to

avoid foraging within 100m of wind turbines, Madsen and Boertmann (2008⁵⁷) showed that these birds demonstrated habituation to the presence of turbines, foraging in 50% smaller avoidance distances than they had initially shown when the wind farms first became operational. Habituation of foraging habitat use by geese and other birds to the presence of operational wind farms has also been shown by Farfan *et al.* (2017⁵⁸).

- 8.171 Zehtindjiev *et al.* (2017⁵⁹) concluded that wind farms in agricultural habitat did not cause any displacement at a landscape scale of red-breasted geese wintering in Bulgaria. Harrison *et al.* (2018⁶⁰) did find local displacement by wind turbines of white-fronted geese wintering in Bulgaria, but considered that the displacement was very small scale, with densities reduced <100 m from turbines. The main determinant of foraging goose density in their study was distance from the roost site rather than presence of wind farms or other human structures such as roads and power lines which had only very local effects (Harrison *et al.* 2018⁶⁰).

Capercaillie

- 8.172 Wind farm operation may cause some displacement of dispersing capercaillie from areas close to turbines and other infrastructure and a likely significant effect on the Darnaway and Lethen Forest SPA population cannot be ruled out. As no evidence of capercaillie was recorded during baseline surveys, capercaillie are only assessed in the context of the Darnaway and Lethen Forest SPA.
- 8.173 As outlined in paragraph 8.125, no capercaillie records were obtained from areas within 2km of any proposed turbine location, and it is likely that the site is not used for lekking, breeding or foraging purposes. As highlighted by SNH (paragraph 8.106), it is however possible that the proposed development could act as a barrier to capercaillie movement between metapopulations, and indeed between the Darnaway and Lethen Forest SPA population to the north and three SPA populations to the south of the site.
- 8.174 Confidential Appendix 8.3: Habitats Regulation Appraisal (HRA) concludes that, at over 4km from the Darnaway and Lethen Forest SPA, any connectivity is likely to be limited to dispersing birds (most likely juveniles) moving between subpopulations within the larger metapopulation. However, because capercaillie habitat in Scotland is fragmented, dispersal may occur over larger distances, which places the site within potential connectivity range of the Darnaway and Lethen Forest SPA.

⁴⁹ Pearce-Higgins, J. W., Stephen, L., Langston, R. H. W., Bainbridges, I. P., and Bullman, R. (2009). The distribution of breeding birds around upland wind farms. *Journal of Applied Ecology*, 46: 1323-1331.

⁵⁰ Drewitt, A.L. and Langston, R.L.H. (2006). Assessing the impacts of wind farms on birds, *Ibis* 148: 29-42.

⁵¹ Masden, E.A., Haydon, D.T., Fox, A.D. and Furness, R.W. (2010). Barriers to movement: Modelling energetic costs of avoiding marine windfarms amongst breeding seabirds. *Marine Pollution Bulletin* 60: 1085-1091.

⁵² Humphreys, E.M., Cook, A.S.C.P., and Burton, N.H.K. (2015). Collision, Displacement and Barrier Effect Concept Note. BTO Research Report No. 669. British Trust for Ornithology, Thetford.

⁵³ Cook, A.S.C.P., Humphreys, E.M., Masden, E.A., & Burton, N.H.K. (2014). The avoidance rates of collision between birds and offshore turbines. *Scottish Marine and Freshwater Science Volume 5 Number 16*. Marine Scotland Science, Aberdeen.

⁵⁴ Rees, E.C. (2012). Impacts of wind farms on swans and geese: a review. *Wildfowl* 62: 37-72.

⁵⁵ Plonczkier, P., and Simms, I.C. (2012). Radar monitoring of migrating pink-footed geese: behavioural responses to offshore wind farm development. *Journal of Applied Ecology*, 49, 1187-1194.

⁵⁶ Larsen J. K. and Madsen, J. (2000). Effects of wind turbines and other physical elements on field utilization by pink-footed geese (*Anser brachyrhynchus*): A landscape perspective. *Landscape Ecology* 15: 755-764.

⁵⁷ Madsen, J. and Boertmann, D. (2008). Animal behavioural adaptation to changing landscapes: spring-staging geese habituate to wind farms. *Landscape Ecology* 23: 1007-1011.

⁵⁸ Farfan, M.A., Duarte, J., Real, R., Munoz, A.R., Fa, J.E. and Vargas, J.M. (2017). Differential recovery of habitat use by birds after wind farm installation: A multi-year comparison. *Environmental Impact Assessment Review* 64: 8-15.

⁵⁹ Zehtindjiev, P., Vasilev, V., Marinov, M.P., Ilieva, M., Dimitrov, D., Peev, S., Raykov, I., Raykova, V., Ivanova, K., Bedev, K. and Yankov, Y. (2017). No evidence for displacement of wintering red-breasted geese *Branta ruficollis* (Pallas, 1769) (anseriformes) at a wind farms area in northern Bulgaria: Long-term monitoring results. *Acta Zoologica Bulgarica* 69: 215-228.

⁶⁰ Harrison, A.L., Petkov, N., Mitev, D., Popgeorgiev, G., Gove, B. and Hilton, G.M. (2018). Scale-dependent habitat selection by wintering geese: implications for landscape management. *Biodiversity and Conservation* 27: 167-188.

8.175 Forested areas within and surrounding the site may provide potential 'stepping-stone' habitat for dispersing capercaillie. However, evidence collated and expert opinion presented in Confidential Appendix 8.3: Habitats Regulation Appraisal (HRA) suggests that the frequency of such dispersal movements is likely to be low. This conclusion is based on the presence of unsuitable habitat within and to the south of the site, the low population in the wider area, and the low rates of dispersal predicted due to the low levels of productivity.

8.176 It is considered very unlikely that the proposed development would provide a significant displacement or barrier risk to dispersing capercaillie. Based on the above considerations, there are considered to be **no adverse effects on the integrity of the Darnaway and Lethen Forest SPA** under the HRA process (paragraphs 8.23 to 8.24 and paragraph 8.105) due to operational disturbance/displacement effects.

Greylag Goose and Pink-footed Goose

8.177 **Effect - foraging displacement or barrier effect:** the turbines and operational activities (e.g. turbine maintenance) may displace birds flying between established foraging and roosting areas or disturb birds from foraging areas located within 100 m of the proposed infrastructure.

8.178 **Sensitivity:**

- Greylag goose - medium-high.
- Pink-footed goose - medium-high.

8.179 **Magnitude of Effect:** as detailed above in paragraph 8.131, there is no evidence of geese using the site or immediate area surrounding the site as a foraging resource. This is confirmed by Mitchell (2012³⁷) with the nearest known foraging area over 4.5km away (Figure 8.19). Furthermore, when reviewing the known foraging areas provided by Mitchell (2012³⁷) in the wider context of the location of the proposed development in relation to the Moray and Nairn Coast SPA, foraging activity is clearly concentrated near the coast and SPA to the north of the proposed development (Figure 8.19) and so the likelihood of the operational site displacing regular flightpaths between foraging areas and the Moray and Nairn Coast SPA is negligible.

8.180 From the activity observed for greylag goose during baseline surveys (Figure 8.20), given what is known with regard to suitable foraging areas around the site, this activity is likely to be related to local movements between Loch Kirkcaldy (south-west of the proposed development) and Loch Tutach (south of the proposed development) and the loch complex immediately to the south-east of Loch Tutach (Figure 8.20) where birds may be resting or roosting. As the turbines are positioned to the north of these lochs, local flightpath displacement is considered unlikely as there will continue to be a clear flightpath between these lochs.

8.181 **Significance of Effect (EIA):** the unmitigated effect during operating on foraging geese and flightpath displacement is considered to be negligible and is therefore **not significant** in the context of the EIA regulations.

8.182 **Significance of Effect (HRA):** Based on the above information, there are considered to be **no adverse effects on the integrity of the Moray and Nairn Coast SPA** under the HRA process (paragraphs 8.23 to 8.24 and paragraph 8.104) due to operation-related disturbance-displacement effects.

Wader Assemblage

8.183 **Effect:** breeding and/or foraging curlew, lapwing and/or golden plover may be displaced from the site during operation, either by disturbance or direct habitat loss.

8.184 **Sensitivity:** medium.

8.185 **Magnitude of Effect:** one pair of curlew and three pairs of golden plover were identified within 500m of the proposed turbines with a further 4-5 curlew territories, two golden plover territories and four lapwing territories outwith the 500m study area.

8.186 Wilson *et al.* (2015²⁰) estimates a 2005 NHZ 10 breeding population of 2,702 breeding pairs of golden plover, and so the potential (temporary) loss of three pairs from the population as a result of the proposed development would equate to a loss of 0.1% of the NHZ 10 population. As a worst-case (where breeding would be lost rather than displaced), an effect of negligible and short-term magnitude is predicted. The likelihood and extent of any displacement on breeding golden plover is however uncertain. Sansom *et al.* (2016⁴⁷) showed that in their study, breeding golden plover abundance may be reduced by 79% up to 400m away from operational wind turbines, although hatching and fledging success were not affected by proximity to turbine locations. Pearce-Higgins *et al.* (2012⁴⁵) in contrast found population densities of golden plover were not affected by the presence of wind farms, and years since construction and the relative overlap between the survey area and the wind farm were unrelated to golden plover densities. A lack of displacement effects for breeding golden plover has been reported for Beinn Tharsuinn Wind Farm (Douglas *et al.* 2011⁶¹) and Farr Wind Farm (Fielding and Haworth 2013⁶²).

8.187 Wilson *et al.* (2015²⁰) estimates a 2005 NHZ 10 breeding population of 811 breeding pairs of curlew and the potential (permanent) loss of one pair from the population as a result of the proposed development would therefore equate to a loss of 0.12% of the NHZ 10 population. As a worst-case (where breeding would be lost rather than displaced), an effect of negligible and short-term magnitude is predicted.

8.188 Lapwing were only recorded breeding over 500m from the proposed turbines and therefore any disturbance/displacement during construction is considered unlikely. As a worst-case

⁶¹ Douglas, D.J.T., Bellamy, P.E. & Pearce-Higgins, J.W. (2011). Changes in the abundance and distribution of upland breeding birds at an operational wind farm. *Bird Study*, 58, 37–43.

⁶² Fielding, A.H. & Haworth, P.F. (2013). Farr wind farm: A review of displacement disturbance on golden plover arising from operational turbines 2005-2013. Haworth Conservation, Isle of Mull.

(where breeding would be lost rather than displaced), an effect of negligible and short-term magnitude is predicted.

- 8.189 **Significance of Effect:** the unmitigated effect during construction for curlew, lapwing and golden plover is considered to be negligible and is therefore not significant in the context of the EIA regulations.

Proposed Mitigation

- 8.190 With no unmitigated significant effects predicted, no additional mitigation is required.
- 8.191 Breeding waders have however been considered in the HMP (Appendix 7.4) with blanket bog and wet heath maintenance, restoration and enhancement proposed for management units A and B (Figure 7.9) and enhancement of the mosaic of upland wader breeding and foraging habitat proposed for management unit C (Figure 7.9). These measures would ensure suitable breeding and foraging habitat for waders is enhanced within the site and would ensure any disturbance/displacement effects are minimised.

Residual Operational Displacement Effects

- 8.192 Given that no additional mitigation is required, the residual effects on geese, waders and capercaillie in relation to operational disturbance/displacement remain the same as considered in paragraphs 8.183 and 8.184, i.e. **not significant** within the context of the EIA Regulations, and **no adverse effect on the integrity of the Moray and Nairn Coast SPA or Darnaway and Lethen Forest SPA** under the Habitats Regulations.
- 8.193 Furthermore, the implementation of the HMP (located of sufficient distance from proposed turbine locations) will further reduce the likelihood of significant effects for breeding waders.

Cumulative Effects

- 8.194 This section presents information about the potential cumulative effects of the proposed development combined with other projects that are located within NHZ 10. Greylag goose and pink-footed goose are also considered within an HRA context relating to the in-combination effects on the Moray and Nairn Coast SPA.
- 8.195 SNH (2018b⁸) provides guidance on assessing the cumulative effects on birds and this assessment follows the principles set out in that guidance.
- 8.196 Cumulative effects may include cumulative disturbance-displacement, collision mortality, habitat loss or barrier effects. Some cumulative impacts (such as collision risk) may be summed quantitatively, but according to SNH (2018b⁸) *“In practice, however, some effects such as disturbance or barrier effects may need considerable additional research work to assess impacts quantitatively. A more qualitative process may have to be applied until quantitative information becomes available for developments in the area, e.g. from post-construction monitoring or research”*.
- 8.197 The main projects likely to cause similar effects to those associated with the proposed development are other operational wind farms, or those under construction, consented or in

the planning process within NHZ 10 for the cumulative assessment (EIA) or those within foraging range (defined per species, as per SNH 2016⁸) of the Moray and Nairn Coast SPA and Darnaway and Lethen Forest SPA for the in-combination assessment (HRA). No other projects or activities subject to the EIA process have been identified for inclusion in the cumulative or in-combination assessments.

- 8.198 Wind farm projects at scoping stage have been scoped out of the cumulative assessment because they usually do not have sufficient information on potential effects to be included, as the baseline survey period is ongoing or results have not been published. Projects that have been refused (and are no longer capable of appeal) or withdrawn have also been scoped out of the cumulative assessment.
- 8.199 Small projects with three or fewer turbines have also been scoped out from the cumulative assessment as often these projects are not subject to the same level of detail of ornithological impact assessment and so there are no directly comparable data. Because of the small scale of such projects, effects are likely to negligible on the IOFs assessed here. Other small-scale renewable projects such as micro-hydro schemes have also been scoped out for similar reasons.
- 8.200 It should also be noted that it is highly unlikely that all projects within NHZ 10/within foraging range of the Moray and Nairn Coast SPA or Darnaway and Lethen Forest SPA would be consented, and even less likely that all would become operational at the same time, and so the additive values represent a highly precautionary assessment of potential cumulative/in-combination effects.

Predicted Cumulative/In-combination Construction Effects

- 8.201 In-combination disturbance/displacement assessments on the SPA populations of greylag goose and pink-footed goose have been scoped out of the cumulative assessment due to the negligible effects predicted for the proposed development alone due to the lack of roosting or foraging geese around the site - nearest known foraging is 4.5km from the proposed development.
- 8.202 The nearby Clash Gour Wind Farm EIA (submitted December 2018) undertook a cumulative/in-combination assessment for capercaillie (same SPAs and NHZ) which concluded that no capercaillie were considered to be at risk of disturbance-displacement effects due to consented or application projects (including the proposed development). With minimal changes in the status of wind farm projects within NHZ 10 since this assessment, it can be reasonably concluded that no significant additional cumulative construction effects on the NHZ 10 or SPA capercaillie breeding population are predicted.
- 8.203 Breeding waders (in particular curlew and golden plover) were identified to be breeding within the 500m study area and so were at risk of potential construction disturbance/displacement. For the proposed development alone the unmitigated effect was considered to be negligible and therefore Not Significant in the context of the EIA Regulations. The cumulative construction assessment for the nearby Clash Gour Wind Farm estimated a maximum of eight curlew and nine golden plover territories (including those recorded at Clash Gour Wind Farm)

with the potential to be affected by consented or application projects. With the addition of the pairs identified at the proposed development, this would come up to nine curlew and 12 golden plover territories or up to 1.1% and 0.4% respectively of the NHZ 10 populations (811 curlew and 2,702 golden plover pairs). A Minor adverse and Not Significant effect in the context of the EIA Regulations is predicted for the NHZ 10 curlew and golden plover populations (increased from Negligible for the proposed development alone).

Proposed Mitigation

8.204 With no unmitigated significant effects predicted, no additional mitigation is required.

Residual Cumulative/In-combination Construction Effects

8.205 Given that no additional mitigation is required, the residual in-combination construction effects remain unchanged, i.e. not significant within the context of the EIA Regulations, and no adverse effect on the integrity of the Moray and Nairn Coast SPA or Darnaway and Lethen Forest SPA under the Habitats Regulations.

Predicted Cumulative/In-combination Operational Effects

8.206 Cumulative collision assessments on greylag goose and pink-footed goose have been scoped out of the cumulative assessment due to the negligible effects of the additional mortality as a result of the predicted collisions associated with the proposed development upon the national wintering populations (greylag goose 0.002%, pink-footed goose 0.03%). Additionally, in the case of pink-footed and greylag geese, the cumulative impacts resulting from wind farms are trivial in comparison to the estimated shooting bag numbers (estimated to be 25,000 pink-footed geese annually in Britain by Frederiksen 2002⁶³ and 8,000 greylag geese annually in Scotland by Trinder *et al.* 2010⁶⁴). Whilst these estimates are now 10-18 years old (and no accurate recording of shooting bags is undertaken in the UK), it is important to note that shooting bag numbers are likely to continue to be several orders of magnitude higher than any cumulative collision estimates, for both geese species.

8.207 In-combination assessments for the Moray and Nairn Coast SPA greylag goose and pink-footed goose populations are also scoped out due to:

- the negligible effects of the additional mortality as a result of the predicted collisions associated with the proposed development upon the SPA populations (greylag goose 0.051%, pink-footed goose 0.045%);
- lack of evidence to support the proposed development being located under a core flightpath for any SPA birds moving between the SPA and foraging areas/staging posts on migration; and
- no suitable/known foraging areas within 4.5km of the proposed development, which is 15.5km from the Moray and Nairn Coast SPA. Under SNH (2013b⁶⁵) guidance the proposed

development would be considered a low risk site for collisions, being over 1.5km from SPA roosts and away from regularly used foraging areas, because “almost all geese will be above collision height; goose collisions at these sites are expected to be very rare”.

8.208 The nearby Clash Gour Wind Farm EIA (submitted December 2018) undertook a cumulative/in-combination assessment for capercaillie (same SPAs and NHZ) which concluded that no capercaillie were considered to be at risk of disturbance-displacement effects due to operational, consented or application projects. As such, no significant additional cumulative operational effects on the NHZ 10 or SPA capercaillie breeding population are predicted.

8.209 Breeding waders (in particular curlew and golden plover) were identified to be breeding within the 500m study area and so were at risk of potential displacement. For the proposed development alone the unmitigated effect was considered to be negligible and therefore Not Significant in the context of the EIA Regulations. The cumulative construction assessment for the nearby Clash Gour Wind Farm estimated a range of 20 to 41 curlew and 43 (corrected to 34 as per the findings of Sansom *et al.* 2016⁴⁷ who found that 79% of territories within 400m remained after construction of wind farms) golden plover territories (including those recorded at Clash Gour Wind Farm) with the potential to be affected by operational, consented or application projects. With the addition of the pairs identified at the proposed development, this would come up to 21 to 42 curlew and 46 (corrected to 36 as per the findings of Sansom *et al.* 2016⁴⁷) golden plover territories or up to 2.5% to 5.2% and 1.3% respectively of the NHZ 10 populations (811 curlew and 2,702 golden plover pairs). A Minor adverse and Not Significant effect in the context of the EIA Regulations is predicted for the NHZ 10 curlew and golden plover populations (increased from Negligible for the proposed development alone).

Proposed Mitigation

8.210 With no unmitigated significant effects predicted, no additional mitigation is required, and with the enhancement measures for waders within the HMP (Appendix 7.4), the operational displacement contribution by the proposed development is likely to be minimal.

Residual Cumulative/In-combination Operational Effects

8.211 Given that no specific mitigation is required, the residual cumulative/in-combination operational effects remain unchanged, i.e. not significant within the context of the EIA Regulations, and no adverse effect on the integrity of the Moray and Nairn Coast SPA or Darnaway and Lethen Forest SPA under the Habitats Regulations.

Interrelationship between Effects

8.212 The potential effects of the proposed development are considered above in terms of effects on ornithology as a discrete environmental topic. Indirect and secondary effects resulting

⁶³ Frederiksen, M. 2002. Indirect estimation of the number of migratory Greylag and Pink-footed Geese shot in Britain. *Wildfowl* 53: 27–34.

⁶⁴ Trinder, M., Mitchell, C., Swann, B. and Urquhart, C. 2010. Status and population viability of Icelandic Greylag Geese Anser in Scotland. *Wildfowl* 60: 64-84.

⁶⁵ SNH (2013b). Geese and wind farms in Scotland: new information.

from the interaction of direct effects arising both within a topic area and interrelated with other topics areas are also possible.

8.213 The potential interrelationship between displacement and collision risk is considered in the collision model. It is assumed via the incorporation of an 'avoidance rate' that a proportion of bird activity within the vicinity of proposed turbine locations will be reduced compared to the baseline survey period, as birds avoid turbines or the proposed development as a whole. Therefore, the risk of collision mortality would be removed by birds being displaced. The effects of habitat loss are likely to be diffuse and this has been considered via the assessment of disturbance and displacement effects.

8.214 Of the other topics with potential to affect ornithological features, those effects identified in Chapter 9: Hydrology, Hydrogeology, Geology and Peat, and Chapter 7: Ecology are most likely to produce a measurable effect. Interrelated effects could potentially occur due to loss or reduction in quality of suitable habitats for breeding, or indirect effects on foraging due to the changes in conditions for prey items. Direct habitat loss effects have been considered above in the Construction Effects sections, and although indirect effects on target species' prey items have not been specifically considered above, these are unlikely to be significant for any species, based on low numbers of target species recorded. Prey species, whether invertebrates for waders and black grouse, or passerines and grouse for raptors, would also benefit from management associated with the HMP.

Summary

8.215 This chapter reports on the baseline ornithological conditions recorded within and around the proposed development and presents an assessment of likely significant effects on populations of identified target species.

8.216 IOFs identified which are considered likely to experience significant effects as a result of the proposed development and that were taken forward into the assessment are: capercaillie, greylag goose, pink-footed goose and a breeding wader assemblage (comprising curlew, golden plover and lapwing). Due to the proximity of the Moray and Nairn Coast SPA and the Darnaway and Lethen Forest SPA and the potential for connectivity with the proposed development, the SPA populations of greylag goose and pink-footed goose (Moray and Nairn Coast SPA) and capercaillie (Darnaway and Lethen Forest SPA) were assessed under the Habitats Regulations.

8.217 Effects related to direct and indirect habitat loss, construction disturbance and displacement, operational displacement, collision risk and cumulative effects were all considered. The residual effects are considered to be Not Significant within the context of the EIA Regulations, and to have no adverse effect on the integrity of the Moray and Nairn Coast SPA or Darnaway and Lethen Forest SPA under the HRA process, for any IOF.

8.218 Cumulative/in-combination effects in relation to capercaillie, greylag goose and pink-footed goose scoped out due to the limited/negligible effects of the proposed development alone (and for capercaillie on the basis of recent cumulative and in-combination information

provided for Clash Gour Wind Farm). Cumulative effects in relation to the breeding wader assemblage (curlew, lapwing and golden plover) were considered to be Minor adverse and therefore Not Significant effect in the context of the EIA Regulations.

Table 8.10: Summary of Residual Effects

Likely Significant Effect	Mitigation	Means of Implementation	Residual Effect
Greylag goose (construction and operation)	None required	N/A	Not significant
Pink-footed goose (construction and operation)	None required	N/A	Not significant
Breeding wader assemblage (construction and operation)	None required (BBPP, HMP)	N/A	Not significant
Moray and Nairn Coast SPA (greylag goose and pink-footed goose)	None required	N/A	No adverse effect on the integrity of the SPA
Darnaway and Lethen Forest SPA (capercaillie)	None required	N/A	No adverse effect on the integrity of the SPA

Chapter 9: Hydrology, Hydrogeology, Geology and Peat

9. Hydrology, Hydrogeology, Geology and Peat

Introduction

- 9.1 This chapter considers the likely significant effects on hydrology, hydrogeology, geology and peat associated with the construction and operation of the proposed Cairn Duhie wind farm. The specific objectives of the chapter are to:
- describe the hydrology, hydrogeology, geology and peat baseline;
 - describe the assessment methodology and significance criteria used in completing the assessment;
 - describe the potential effects, including direct, indirect and cumulative effects;
 - describe the mitigation measures proposed to address likely significant effects;
 - assess the residual effects remaining following the implementation of mitigation.
- 9.2 The direct and indirect potential impacts of the proposed development upon the baseline environment during construction and operation are identified within this chapter. Mitigation measures to alleviate those impacts are identified and the significance of the residual impacts are presented.
- 9.3 This chapter draws upon habitat survey data presented within Chapter 7: Ecology.
- 9.4 The assessment has been carried out by Jude Jeans C.WEM, MCIWEM, PIEMA, Director of Wallingford HydroSolutions Ltd (WHS). Jude has been a Practitioner (previously Associate) member of IEMA since 2009, and a Chartered Water and Environment Manager since 2018. She is also a member of the British Hydrological Society. WHS is the developer of the UK industry standard software for the estimation of flood risk (Flood Estimation Handbook) and river flows (LowFlows), and we offer nationally recognised expertise in hydrology. Jude has worked on and led hydrological impact assessments for wind farms across the UK since 2005. She has provided specialist hydrology, hydrogeology and geology input at a variety of stages within the Environmental Impact Assessment (EIA) process to over 50 wind farms.
- 9.5 This chapter is supported by:
- Appendix 4.2: Outline Construction and Decommissioning Environmental Management Plan (CDEMP);
 - Appendix 7.4: Outline Habitat Management Plan;
 - Appendix 9.1: Phase 2 Peat Probing & Peat Coring Study;
 - Appendix 9.2: Peat Landslide Hazard and Risk Assessment;
 - Appendix 9.3: FRA & Surface Water Management Plan;
 - Appendix 9.4: Private Water Supply Risk Assessment; and
 - Appendix 9.5: Carbon Balance Assessment.
- 9.6 Figures 9.1 - 9.4 are referenced in the text where relevant.

Planning

- 9.7 Scottish Planning Policy (2014) provides a statement of Scottish Government policy on land use planning, incorporating guidance on flooding and drainage for development. The policy requires the avoidance of development in areas that would have a significant probability of being affected by flooding or would increase the probability of flooding elsewhere. The guidance emphasises the need to apply sustainability principles to drainage and the prevention of flooding and the control of future development.
- 9.8 The policies relevant to this assessment within the Highland-Wide Local Development Plan (2012) are:
- Policy 55 Peat and Soils;
 - Policy 63 Water Environment;
 - Policy 64 Flood Risk; and
 - Policy 67 Renewable Energy Development.
- 9.9 The site shares a boundary with Moray Council, and several of the catchments within the site extend into the Moray Council area. The policies relevant to this assessment within the Moray Council Local Plan (2015) are:
- Local Plan Policy EP4 - Private Water Supply;
 - Local Plan Policy EP5 - Surface Water Drainage Sustainable Urban Drainage Systems;
 - Local Plan Policy EP6 - Water Bodies and;
 - Local Plan Policy EP8 - Pollution.

Scope of Assessment

Effects Assessed in Full

- 9.10 The proposed development may induce a series of potential adverse effects upon the hydrology, hydrogeology, geology and peat environment within the vicinity of the proposed works.
- 9.11 This chapter assesses the following potential effects during the construction and operational phases:
- Direct effects on water quality, water resources, peat hydrology and flood risk of the surface and ground water in the draining sub-catchments.
 - Indirect effects on the identified Private Water Supplies (PWS) and other water users in the area.
 - Indirect effects on the Groundwater Dependent Terrestrial Ecosystems (GWDTE) and peat habitat identified within the site. The direct loss of habitat is considered within Chapter 7: Ecology.

Effects Scoped Out

- 9.12 On the basis of consultation, professional judgement and the extent and type of development proposed, no effects were scoped out of this assessment.

Assessment Methodology

Legislation and Guidance

Legislation

- 9.13 This hydrological assessment has been undertaken in accordance with the following legislation:
- The Water Framework Directive (WFD 2000/60/EC).
 - Water Environment and Water Services (Scotland) Act 2003 (WEWS).
 - Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended 2013 and 2017).
 - The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017.
 - The Water Environment (Drinking Water Protected Areas) (Scotland) Order 2013.
 - Pollution Prevention and Control (Scotland) Regulations 2012.
 - The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017.

Guidance

- 9.14 This hydrological assessment has been carried out in accordance with the principles outlined in the following documents:
- Scottish Government Onshore wind turbines: planning advice (2014).
 - Scottish Renewables, SNH¹, SEPA, Forestry Commission Scotland, Historic Environment Scotland, Marine Scotland Science, AEECoW, 4th Edition (2019). Good Practice during Wind Farm Construction.
 - Pollution Prevention Guidelines (PPG) 1. (2013) General guide to the prevention of water pollution.
 - Guidance for Pollution Prevention (GPP) 5. (2018) Works and maintenance in or near water
 - PPG06. (2015) Working at construction and demolition sites.
 - GPP21. (2017) Pollution incident response plans.
 - SEPA (2017). Land Use Planning System, SEPA Guidance Note 4: Planning advice on wind farm developments. Version 8.
 - CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland.
 - SEPA (2009) Policy No.19. Groundwater Protection Policy for Scotland.
 - Scottish Natural Heritage (2015). Constructed tracks in the Scottish Uplands.

- Forestry Commission, 2017. UK Forest Standard. Fourth Edition.
- Forestry Commission, 2011. Forest and Water Guidelines. Fifth Edition.

- 9.15 A considerable body of guidance material has been produced for wind farm construction in the peat uplands of the UK. Relevant guidance documents that have been considered to inform the peat assessment are drawn from sources throughout the UK, and effectively constitute UK-wide best practice; these include guidance in relation to peat management, peat slide risk and carbon balance:

- Natural England, 2010. Investigating the impacts of wind farms on peatlands.
- Scottish Renewables and SEPA 2012. Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste.
- Scottish Government Wind Farm developments on Peat Land: Carbon Calculator Tool v1.6.1.
- 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).
- SNH, SEPA, Scottish Government and The James Hutton Institute 2011. Guidance Developments on Peatland: Site Surveys.
- Joint Nature Conservation Committee 2011. JNCC Report No. 445 Towards an assessment of the state of UK Peatlands.
- Energy Consents Unit Scottish Government 2017. Peat Hazard Landslide Risk Assessments Best Practice Guide for Proposed Electricity Generation Developments.

Consultation

- 9.16 Consideration has been given to the scoping responses and other consultation undertaken as detailed in Table 9.1 below.

Table 9.1: Consultation Responses

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action
Energy Consents Unit [13/05/2020]	Formal Scoping Consultation	Advised that potential effects on PWS should be considered in the EIA Report.	A Private Water Supply Risk Assessment is detailed in Appendix 9.4 and summarised in the Likely Significant Effects section.
The Highland Council (THC) [27/03/2020]			
SEPA [16/03/2020]			

¹ Scottish Natural Heritage (SNH) changed its name to NatureScot at the end of August 2020; due to the timescales in which the Cairn Duhie EIA Report was drafted, these terms are used interchangeably within this chapter

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action
The Highland Council [18/09/2020]	Further consultation on PWS	Data request for an update to the list of locations of PWS within the sub-catchments draining the Site provided in 2012.	Locations provided and described within the Baseline Conditions section below.
Moray Council [30/07/2020]	Further consultation on PWS	Data request for an update to the list of locations of PWS within the sub-catchments draining the site provided in 2012.	Locations provided and described within the Baseline Conditions section below.
The Highland Council [27/03/2020]	Formal Scoping Consultation	The EIA Report should include an assessment of the effects on deep peat and GWDTE (with avoidance demonstrated).	This is considered within the Likely Significant Effects section.
SEPA [16/03/2020]			
Scottish Natural Heritage [03/04/2020]			
The Highland Council [27/03/2020]	Formal Scoping Consultation	Scheme should be designed to avoid crossing watercourses.	There are no watercourse crossings.
The Highland Council [27/03/2020]	Formal Scoping Consultation	Carbon balance calculations should be undertaken and payback summarised within the EIA Report.	This is detailed in Appendix 9.5 and payback summarised in the Predicted Operational Effects section.
East Nairnshire Community Council [17/03/2020]	Formal Scoping Consultation	Advised that potential effects on Loch Kirkcaldy trout loch should be considered in the EIA Report.	This is considered within the Likely Significant Effects section.
SEPA [10 July 2020]	Further consultation on Controlled Activities Regulations (CAR) abstraction licences	Data request for details of CAR abstraction licences within the sub-catchments draining the site.	Confirmed that there are no active abstraction licences within 6km of NGR 297837, 842859.

Baseline Characterisation

Study Area

- 9.17 Hydrology naturally falls into sub-catchments, of which there are multiple draining from the 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 9.2 and are detailed further below.

Desk Study

- 9.18 The following data sources have informed the assessment [all accessed in July 2020]:
- Ordnance Survey mapping at 1:50,000, 1:25,000 and 1:10,000 scales.
 - British Geological Survey 1:50,000 scale digital geological maps for Scotland (Web Map Services <https://www.bgs.ac.uk/data/services/digmap50wms.html>).
 - Scotland & Northern Ireland Forum for Environmental Research 1:100,000 Groundwater Vulnerability mapping.
 - Soil map of Scotland 1:25,000 scale via the Scotland's Soils map within the Scotland's environment website (http://map.environment.gov.scot/Soil_maps/).
 - SEPA River Basin Management Plans (<https://www.sepa.org.uk/data-visualisation/water-environment-hub/>).
 - Drinking Water Protected Areas and Groundwater classification via the Scotland's environment website (<http://map.environment.gov.scot/>).

Field Survey

- 9.19 A walkover of the site was conducted on 19th and 20th July 2012 as part of the original survey for the consented development. A further site walk over was not considered necessary for this application, as an update to site conditions was determined through the ecological surveys presented in Chapter 7: Ecology which confirmed that there were no material changes to the conditions onsite that would require further field work to be undertaken to inform the hydrology assessment.
- 9.20 All properties identified as requiring a Private Water Supply risk assessment were visited on 13th and 14th May 2013. Further consultation was conducted with residents, The Highland Council and Moray Council, as presented in Table 9.1, which confirmed there had been no material changes to PWS, therefore a further site visit was not required.

Assessing Significance

Sensitivity Criteria

- 9.21 Sensitivity of hydrological receptors has been determined on the basis of the criteria defined in Table 9.2.

Table 9.2: Receptor Sensitivity

Receptor Sensitivity	Criteria
High	<ul style="list-style-type: none"> 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 10m³/day for human consumption or serves more than 50 persons². Watercourse widely used for activities relating to water quality (e.g. fisheries, swimming, etc). Highly dependent GWDTE.
Medium	<ul style="list-style-type: none"> 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). 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 PWS supplying less than 10m³/day for human consumption or serves less than 50 persons (Error! Bookmark not defined.). Watercourse is not widely used for activities relating to water quality. Moderately dependent GWDTE.
Low	<ul style="list-style-type: none"> 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.

Magnitude of Effect

- 9.22 The magnitude of change has been established based on the criteria presented in Table 9.3, the magnitude of change is differentiated between short term construction impacts and long-

term operational impacts for each receptor. Differentiations between categories in Table 9.3 are based upon professional judgement.

Table 9.3: Magnitude of Change

Magnitude	Change to the Baseline Environment
Large	<ul style="list-style-type: none"> Long term loss of resource and/or quality; partial loss of or damage to key characteristics, features or elements.
Moderate	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Short term very minor loss or detrimental alteration to one or more characteristics, features or elements.
No Change	<ul style="list-style-type: none"> No loss or alteration of characteristics, features or elements.

Significance Criteria

- 9.23 The significance of the impacts upon the baseline environment is defined as a function of the sensitivity of receptors and the magnitude of change to the baseline conditions. The significance criteria in Table 9.4 will be followed, which is based upon the principles of the Chartered Institute of Ecology and Environmental Management's (CIEEM) guidelines for ecological impact assessment in the United Kingdom³.

- 9.24 **Moderate** or **Major** impacts are deemed significant in the context of the EIA Regulations. Impacts that are Minor, Negligible or result in No Change are judged to be not significant. Differentiations between categories in Table 9.4 are based upon professional judgement.

Table 9.4: Significance Criteria

Site Sensitivity	Magnitude of Change				
	Large	Moderate	Small	Negligible	No Change
High	Major	Moderate	Minor	Negligible	None
Medium	Moderate	Minor	Negligible	None	None
Low	Minor	Negligible	None	None	None

Assessment Limitations

- 9.25 It is extremely difficult to identify all PWS in any area, particularly one as rural as the study area for the proposed development. For example, records usually identify the property

² The Water Environment (Drinking Water Protected Areas) (Scotland) Order 2013

³ CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland (<https://cieem.net/wp-content/uploads/2019/02/Combined-EcIA-guidelines-2018-compressed.pdf>)

supplied 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. Consequently, several additional properties within the drainage pathways of the site not listed by the Councils that potentially could have a PWS were identified during the desktop study. Where information regarding a potential PWS could not be obtained, a conservative assumption was made that a PWS is in use at that that property. Further consultation conducted with residents, The Highland Council and Moray Council, confirmed there had been no material changes to PWS since the field work for the consented development was undertaken, therefore a further site visit was not required. It is considered that there is sufficient information to enable an informed decision to be taken in relation to the identification and assessment of likely significant environmental impacts on PWS.

- 9.26 Several phases of peat probing were undertaken by MacArthur Green in 2012 and 2013. As detailed in Appendix 9.2, additional probing was not undertaken at each new turbine location due to current Covid-19 restrictions. However, on this site it was determined as part of the Peat Landslide Hazard and Risk Assessment that the data quality was suitable and the interpretation could be projected to the amended layout of the proposed development.
- 9.27 No further assessment limitations have been identified.

Baseline Conditions

Current Baseline

- 9.28 The baseline environmental conditions are described in relation to the hydrology, hydrogeology, geology and peat of the site, and provide details on:
- the superficial and bedrock geology underlying the site, the overlying soils and peat, and hence, the hydrogeology of the site;
 - the surface hydrology and site drainage including 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.
- 9.29 The future baseline under a “do nothing” scenario is then discussed.

Geology, Hydrogeology, Soils and Peat

Bedrock Geology

- 9.30 The solid strata within the site are comprised of approximately half igneous and half metamorphic impermeable rock (Figure 9.1)⁴. The western extent of the site is dominated by Ardoch Granite Pluton, while the eastern extent is composed of metamorphosed

sedimentary bedrock of Dava Subgroup to the north east and Glen Banchor Subgroup to the south east. A reverse or thrust fault is present between the two metamorphic subgroups, with two fault lines mapped in the Dava Subgroup within the site.

- 9.31 Glacial meltwater channels are also mapped along the channels of the Stripe of Little Lyne and Stripe of Muckle Lyne, as well as from the south east flank of Cairn Duhie. Two esker crestlines formed by meltwater are also present in the south west of the site.
- 9.32 As the site consists of impermeable igneous and metamorphic rock it is unlikely any significant volumes of groundwater will be present. This is confirmed by the SEPA and Scotland and Northern Ireland Forum for Environmental Research (SNIFFER) Baserock Aquifer Map⁵, which classifies the bedrock underlying the site as having predominantly fracture flow of low productivity in terms of groundwater abstraction. It is therefore likely that any localised groundwater will follow the fractures within the bedrock or possibly the boundary between the metamorphic rock and igneous rock running north to south through the centre of the site.

Superficial Geology

- 9.33 The majority of the site is overlain with Devensian Till located in the central and northern extents of the site. A combination of peat and glaciofluvial Devensian deposits are present in the southern and eastern extents of the site. Alluvium is present along short reach of the Stripe of Muckle Lyne. There is one small area of exposed bedrock near the centre of the site on the peak of Cairn Duhie.
- 9.34 The areas of till, glaciofluvial deposits and alluvium 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 SEPA and SNIFFER Superficial Aquifer Map⁽⁵⁾ which indicates intergranular flow of low to high productivity in the southern extents of the site.

Soils and Peat

- 9.35 The Soil map of Scotland 1:25:000 scale indicates a range of peat soils across the site including semi-confined peat, valley peats at 50-100cm deep, peaty gleys and peaty gleyed podzols. The peat and peaty soils, which are present across the majority of the site will have a varying degree of saturation. The Scotland's Soils Map indicated that there is high soil runoff risk across the site with the soils having limited capacity to store rainfall or to allow water to infiltrate. The areas of peat have a high risk of erosion, with the soils with a peaty surface layer of a medium risk of erosion varying upon the gradient of the slope.
- 9.36 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. Peat depth surveys have been undertaken across two phases by MacArthur Green in 2012 and 2013 (see Appendix

⁴ British Geological Survey 1:50,000 scale digital geological maps for Scotland (Web Map Services <https://www.bgs.ac.uk/data/services/digmap50wms.html>).

⁵ SNIFFER (2004) Development of a groundwater Vulnerability Screening Methodology for the Water Framework Directive

9.2). A total of 1,461 peat depth probes were carried out during the surveys. It was noted that only 6% (75) of the peat probes undertaken recorded peat depths greater than 2.0m (maximum thickness of peat recorded was 5.1m). The highest percentage of probes recorded peaty soil <0.5m thick (43.6%). 84% (1250) of the total probes recorded peat less than 1.5m thick. The Peat Landslide Hazard and Risk Assessment presented in Appendix 9.2 determined that the data quality was good and the interpretation could be projected to the amended sites.

9.37 The MacArthur Green Ltd peat depth probing survey also confirmed the presence of superficial Glacial Till (Diamicton) underlying the peat.

Groundwater Vulnerability

9.38 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⁽⁵⁾. As noted above, 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

9.39 The proposed development is located within the River Findhorn catchment. The sub-catchments draining the proposed development are shown in Figure 9.2.

9.40 The northern and western extents of the site directly drain to the River Findhorn via two sub-catchments (displayed in Figure 9.2):

- Sub-catchment A (Stripe of Little Lyne and Stripe of Muckle Lyne) is 6.5km² in size. This sub-catchment drains northwards via two main tributaries; the Stripe of Little Lyne and Stripe of Muckle Lyne. These tributaries confluence at NH976459, before flowing approximately 1.2km 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 3.2km².
- Sub-catchment B (Tomnarroch Burn) is the largest of the sub-catchments with an area of 9.4km². 30% of the site (equivalent to 2.0km²) 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. Loch Kirkcaldy trout loch is located in the headwaters of this catchment. However, the watercourse in the southwest of the site which flows west into the Tomnarroch Burn is confluent with the outlet from the loch, thus Loch Kirkcaldy does not receive any drainage from the site.

9.41 The eastern extents of the site drain to Dorback Burn, which flows northwards to its confluence with the River Findhorn at NJ001499. The Dorback Burn drains the site via two sub-catchments:

- Sub-catchment C (Burn of Lochantùtach) drains the most 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 6.4km² in size, containing 1.2km² (equivalent to 18%) of the site. Lochan Tùtach is situated outside of the site, draining the southern boundary of the site.
- Sub-catchment D (unnamed) comprises a number of small tributaries which drain directly into Dorback Burn. As an amalgamation of tributaries, sub-catchment D is not a true catchment, but will be referred to as sub-catchment D for the purposes of defining the surface water features draining the site. Only 0.3km² (equivalent to 4%) of the site is located within this sub-catchment.

9.42 There are a series of natural springs, channels and drains located throughout the sub-catchments.

Topography and Land Use

9.43 The site is generally flat with 89% of the site at a gradient less than 8%, ranging from 198m (Above Ordnance Datum) AOD to 312m AOD at the summit of Cairn Duhie located just off-centre of the site.

9.44 The site is predominately vegetated with rough grassland and heathland with isolated areas of mixed woodland. 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 2012 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

9.45 The annual average rainfall over the site is 824mm. The seasonal distribution of the rainfall is typical for the region, 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 405mm. Given the low permeability of the bedrock geology and high ability to store water 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.

9.46 Table 9.5 presents the estimates of the mean flow and 95th exceedence percentile flow (Q95) determined using the LowFlows software system⁶, as well as the median annual flood determined using the Flood Estimation Handbook Web Service catchment data and associated methods⁷. Observed flow statistics are also presented for the gauging station downstream of the site on the River Findhorn at Forres (station number 7002).

Table 9.5: 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	0.090	20.4	1.95
B	NH960452	Tomnarroch Burn	9.42	0.139	19.7	2.48
C	NH994421	Burn of Lochantùtach	6.42	0.099	18.2	1.83
D	n/a	Unnamed tributaries of the Dorback Burn	2.95	n/a	n/a	n/a
GSTN 07002 Findhorn @ Forres	NJ018583	Findhorn	781.9	19.643	17.0	349

9.47 The site (6.66km²) encompasses a relatively high proportion of the sub-catchments draining the site, which drain a total area of 25.29km². Subsequently, the surface water hydrology and drainage at the sub-catchment scale may potentially be altered by construction activities.

Flooding

9.48 SEPA's online flood maps⁸ show the site is situated in an area of 'little or no' fluvial flood risk. Flooding in the area is constrained by the relatively steep topography with the closest area at risk being located around the Lochan Tutach on the Burn of Lochantutach outside the southern perimeter of the site.

9.49 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, as do the Tomnarroch Burn (which drains the western extents of the site into sub-catchment B) and the Dorback Burn and Burn of Lochantùtach (sub-catchment C).

9.50 The majority of the site is shown to be at 'little or no risk' of flooding from pluvial sources. Towards the northern and southern perimeters of the site, several isolated spot areas of high, medium and low risk of pluvial flooding are observed. These are small areas and the risk here is thought to be due to localised depressions in the SEPA pluvial flood model DTM.

9.51 The site is not at risk of coastal flooding or groundwater flooding, as confirmed on SEPA's online flood maps.

9.52 Further details and maps of the site flood risk are presented in Appendix 9.3.

Artificial Land Drainage

9.53 The Ordnance Survey 1:10000 scale mapping and aerial photography indicate a significant number of land drains within the site, as displayed on Figure 9.4, which were confirmed during the 2012 site visit including:

- Drains along the western boundary, which are drainage ditches for the A939.
- Numerous land drains flow from the Burn of Lochantùtach south into Lochan Tùtach. Eleven straight north to south drains were identified as flowing into Lochan Tùtach, which are of narrow width and depth (approximately 0.3m x 0.5m, respectively).
- 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 seven additional land drains which change direction and run parallel to the Burn of Lochantùtach, flowing west to east.
- The northern extents of the site contain a series of narrow, regularly spaced artificial land drains running east to west from the Hill of Fevene into the Stripe of Muckle Lyne.

9.54 In the north east of the site near an area of unnamed forestry, the 2012 site visit also identified a series of unmapped peat cuts, running west to east with drying peat and fresh peat cuts visible.

Water Quality

9.55 As part of the River Basin Management Plans, SEPA classify the current status and identify the pressures and possible measures to address these to reach future classification objectives of all waterbodies. The sub-catchments draining the site drain into two waterbodies.

9.56 Sub-catchments A and B drain into the middle reaches of the River Findhorn. This waterbody (Tomatin to Dorback Burn) has an overall status of 'Moderate' due to access to fish migration, but with a water flows and levels status of 'High' and a water quality status of 'High'. The target objective for the River Findhorn is for the status to improve to 'Good' status by 2027 and remain good for the long term.

⁶ 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).

⁷ Reed, D. (1999). Flood Estimation Handbook. Institute of Hydrology.

⁸ Scottish Environment Protection Agency Online Flood Maps (<http://map.sepa.org.uk/floodmap/map.htm>)

9.57 Sub-catchments C and D drain into the Dorback Burn. The Dorback Burn / River Divie waterbody has an overall status of 'Good', with a water flows and levels status of 'High' and a water quality status of 'High'. The target objective for the Dorback Burn is for the status to remain good in 2021, 2027 and the long term.

9.58 Water quality within the sub-catchments may be affected by the construction and operation of the proposed 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

Drinking Water Protection Zones

9.59 The site is within the extent of both the Strathnairn, Speyside and Cairngorms Groundwater Drinking Water Protection Zone, designated under the Drinking Water Directive, and the Findhorn and Muckle Burn Sand and Gravel Aquifer. Both groundwater bodies are of 'Good' status, with a target objective to remain good in 2021, 2027 and the long term.

Private Water Supplies

9.60 A Private Water Supply Risk Assessment (PWSRA) was conducted in 2012-2013 and reviewed as part of this assessment. The Highland Council and Moray Council were consulted regarding their records of any properties served by a PWS within the vicinity of the site, see Figure 9.2. The Highland Council identified 27 properties on a PWS within close proximity of the proposed development, but none within the site. There was no information provided on the location of the sources. The Moray Council identified 12 properties supplied by 20 sources within close proximity of the proposed development, but none within the site. As other PWS abstractions could exist in the vicinity of the site, 23 additional properties within the drainage pathways of the site were also identified during the desktop study. Although these properties were not identified by The Highland Council or Moray Council, it is possible that they may use a PWS and these are identified as those with 'Additional Potential' on Figure 9.2.

9.61 Details were reconfirmed with The Highland Council and Moray Council for this application, as detailed in Table 9.1. Although some additional PWS properties and sources were identified by the councils compared to their data held in 2012, these properties or groups of properties had all been already identified through the desk-based study as Additional Potential PWS. Thus, there are no material changes to PWS. A total of 62 properties have therefore been identified as potentially being served by a PWS.

9.62 The requirement for a PWSRA has been assessed for each of the PWS properties identified within the desk-based study as presented in Figure 9.2, with full details presented in Appendix 9.4. Of the 62 properties identified, 26 properties warranted a detailed risk assessment based upon the location and topography with respect to the proposed development. 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 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.

9.63 The 26 properties which were identified as requiring a PWSRA are presented in Table 9.6. The 2012-2013 PWSRA consulted 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 these, twelve PWS were confirmed through consultation with the property residents. A number of these supplies provide drinking water to more than one property. Full details are presented in Appendix 9.4.

9.64 Of the PWS identified in 2012-2013, the four properties with a source within 500m of the site, plus the one property where use of a Private Water Supply could not previously be established were contacted in 2020 to confirm the information held regarding their water supply (see Table 9.6). All other sources were too distant and outside the hydrological drainage paths from the site to be at risk, even if the details of their supply had changed since 2012-2013. Further details are presented in in Appendix 9.4.

Table 9.6: Properties considered within the PWSRA

Property	Property NGR	Use of PWS confirmed by 2012-2013 Site Visits
1-6 Forestry Houses	NH964457	No - mains supply
Achnabechan Farm	NH959437	Yes
Airdrie Farm	NH979469	Yes
Airdrie Mill	NH976459	Unknown - No response in 2013 or 2020
Aitnoch	NH981397	Yes
Boathouse at Loch Kirkcaldy	NH964416	No water supply
Boathouse at Lochan Tùtach	NH986402	No water supply
Braemoray Lodge	NH998428	Yes
Culfearn	NJ000438	Yes
Factors House	NH958445	No - mains supply
Ferness Old Post Office	NH964451	No - mains supply
Ferness Village	NH963450	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 - confirmation requested in 2020, information held assumed still applicable
Logie Farm & Riding Centre	NH969466	Yes
Muckle Lyne	NH979453	Yes - confirmation requested in 2020, information held assumed still applicable
Score Farmhouse & Farm	NH973459	Yes - details reconfirmed in 2020
The Mount*	NH979458	Yes - confirmation requested in 2020, information held assumed still applicable
The White House	NJ001433	Yes
Tombain	NJ006443	Yes
Tomdow	NJ006444	Yes

Property	Property NGR	Use of PWS confirmed by 2012-2013 Site Visits
Tomnarroch Farm	NH962445	No - mains supply
Unknown nr Achnabechan	NH958437	No - derelict building

Controlled Activities Regulations Abstraction Licences

9.65 Controlled Activities Regulations (CAR) authorisations are protected from derogation by other users. SEPA has confirmed that there are no CAR abstraction licences located within 6km of the site (NGR 297837, 842859), see Table 9.1.

Designated Sites

9.66 The River Findhorn (which receives water from all the sub-catchments), harbours freshwater fish and was a designated waterbody under the now repealed Fresh Water Fish Directive (2006/44/EC) for the presence of salmonids. This is considered further within Chapter 7: Ecology.

9.67 Moidach More SSSI and SAC lies east of the site 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 Britain⁹, but is hydrologically disconnected from the site and therefore would not be affected by the proposed development.

9.68 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 7: Ecology, Figure 7.1. 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, 4km upstream of the SSSI and SAC site. It is unlikely that any potential impacts from the proposed development would propagate downstream and affect by the SSSI and SAC, due to the distance upstream of the site.

9.69 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 20km) to be at no risk from the proposed development.

9.70 On the basis that changes to hydrology will not affect any of the designations note above, potential effects on designated sites are not considered further within this chapter.

Groundwater Dependent Terrestrial Ecosystems

9.71 A number of GWDTE have been identified within the site by the National Vegetation Classification (NVC) Survey as detailed in Chapter 7: Ecology. As presented in Figure 9.3, the GWDTE are all underlain by peat and either by till or glaciofluvial superficial deposits, which

may have a high surface-groundwater connectivity with upslope runoff and shallow sub-surface flows.

Future Baseline and Implications of Climate Change

9.72 The baseline environment is unlikely to change from the current baseline under the “do nothing” scenario in terms of land use, water use and water quality. Although the overall status of the River Findhorn has a target to improve from moderate to good by 2027, this is related to the aim of improved fish migration, therefore not of direct relevance to this assessment.

9.73 The 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 decrease¹⁰. Therefore, changes in runoff and recharge characteristics may occur on the site, even without development.

9.74 Due to the unknown variables associated with the future baseline, the assessment of the baseline environment has considered the existing baseline situation.

Cairn Duhie Wind Farm Design Considerations

9.75 The objective of reducing potential impacts was an inherent part of the design of the infrastructure of the proposed development. This section presents the layout design constraints, along with mitigation of the site drainage to be incorporated into the Outline CDEMP, see Appendix 4.2. As such, these measures are assumed to be in place for the purposes of the assessment presented below.

Layout Design Constraints

9.76 The design of the proposed development has evolved through a number of iterations, taking account of environmental designations and constraints. The information collated within the baseline assessment was used to identify hydrologically sensitive areas of the site and hence develop a map of constraints inform the location of the infrastructure of the proposed development. The hydrological features and constraints map is presented in Figure 9.4.

9.77 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 GPP5¹¹, has conservatively been defined as 50m. These exclusion zones are shown on Figure 9.4 which ensures all infrastructure would be located at least 50m from surface water features. Turbine

⁹ 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 (<https://sitelink.nature.scot/map>)

¹⁰ Centre for Ecology and Hydrology. 2012. Future Flows and Groundwater Levels (http://www.ceh.ac.uk/sci_programmes/Water/FutureFlowsandGroundWaterLevels.html)

¹¹ Guidance for Pollution Prevention (GPP) 5. (2018) Works and maintenance in or near water

centres are positioned at least a 70m from surface water features to account for the turbine foundation diameter.

- 9.78 The PWS and GWDTE located within 100m of roads, tracks and trenches and 250m from foundations and borrow pits have been identified in the wind farm design process, in accordance with SEPA Guidance¹². Of the PWS, a 250m exclusion zone extending within the site has been applied to the Score Combined Supply, Muckle Lyne Supply and Little Lyne Backup Supply, as presented on Figure 9.4.
- 9.79 For the GWDTE, 100m buffers for tracks and trenches, and 250m buffers for turbines and borrow pits was used to minimise any encroachment into these buffer zones (see Figure 9.3) albeit that it has not been possible to avoid these areas entirely. Development within these areas requires additional location specific mitigation as noted below.
- 9.80 To minimise potential erosion, 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 200m) up to 12.5%¹³. Figure 9.4 highlights where the topographic gradient (based upon a 5m Digital Terrain Map) exceeds 8% and 12.5%. The orientation of the tracks has been constrained to keep track gradients below 8%.

Site Drainage Design

- 9.81 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, will be mitigated through the following measures which are incorporated into the outline CDEMP and outline drainage design (see Appendices 4.2 and 9.3):
- Use of floating track design where the access tracks cross peat greater than 1m in depth to limit the disturbance of peat and localised subsurface flow paths. Construction of the floating tracks will 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 will be free draining, strong, durable and well graded.
 - Settlement/attenuation ponds and silt fences will be provided adjacent to the track drains to avoid pollution and sedimentation of watercourses or GWDTE.
 - Avoidance of directing track drainage into existing watercourses (via swales and under road cross drains, with detailed design presented in Appendix 9.3) will ensure that sediment and runoff from disturbed ground is not routed directly to the watercourses.
 - The historical land drains located across the site will be piped directly under the access track through appropriately sized drainage pipes or culverts. Appropriate scour prevention and energy dissipation structures will be constructed at each culvert outlet. Where

appropriate a shallow, lateral drainage swale will be installed at the toe of access track cuttings to intercept the natural runoff. This lateral drain will be piped under the track at regular intervals through correctly sized cross drains away from watercourses. Again, appropriate scour prevention and energy dissipation structures will be constructed at each culvert outlet.

- Flow and sediment transport in any track drainage swales will be minimised by reducing concentrated flows, installing regular cross culverts and the use of check dams placed at regular intervals within the roadside drainage swales.
- Where required, track drainage swales will discharge into sediment/attenuation ponds excavated on the downslope side or silt fences. A shallow drainage swale will 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 will 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 will be kept to the minimum necessary to allow free drainage of the tracks. Swale lengths will be minimised to avoid disruption of natural drainage paths. Direct drainage into existing watercourses will also be avoided to ensure that sediment and runoff from disturbed ground is not routed directly to the watercourses.
- Impermeable (e.g. clay) plugs will be inserted within cable trenches at a frequency agreed with the Ecological Clerk of Works (ECoW) to suit the specific location to prevent gullyng of trenches and preferential routing.

Micrositing

- 9.82 The layout of the turbines, and hence tracks and cables, is subject to a 50m micrositing allowance. The assessment of impacts presented within this chapter has been based upon the layout defined in Chapter 4: Development Description. Any micrositing changes will respect the exclusion zones and hydrological layout constraints, shown on Figure 9.4 such that no infrastructure would be moved to the extent that impacts would be any greater than those reported in this chapter.

Likely Significant Effects

- 9.83 This section describes the direct potential significant impacts of the proposed development on the baseline environment 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 water use (specifically PWS), GWDTE and aquatic ecology. The likely significant effects upon aquatic ecology are presented in Chapter 7: Ecology.

¹² SEPA (2017). Land Use Planning System, SEPA Guidance Note 4: Planning advice on wind farm developments. Version 8.

¹³ Scottish Natural Heritage (2015). Constructed tracks in the Scottish Uplands

Embedded Mitigation Measures

9.84 The design of the proposed development has ensured the potential impacts have been minimised where possible, but further mitigation will be required to offset any potential significant impacts. The embedded mitigation measures which are assumed to be in place during construction and operation are presented below. These are included within the Outline CDEMP (refer to Appendix 4.2).

Runoff and Sediment Control Measures During Construction

9.85 The following measures will be used to mitigate any potential impacts on the water quality of the sub-catchments through erosion during construction. These are incorporated into the outline CDEMP and outline drainage design described above and as detailed in Appendices 4.2 and 9.3.

- Sediment control measures (silt fences, settlement/attenuation ponds etc.) will be used in the vicinity of watercourses, springs, GWDTE or drains where natural features (e.g. hollows) do not provide adequate protection.
- Sediment control measures (e.g. check dams, silt fences etc.) will be employed within the existing artificial drainage network during construction. These will be regularly checked and maintained during construction and for an appropriate period following completion. The Outline Habitat Management Plan (Appendix 7.4) prescribes the damming of active drains to sufficiently raise water levels to create suitable conditions for *Sphagnum* species.
- Watercourses will be monitored throughout the construction period by the ECoW to identify any enhanced scouring of the catchment surface. If sediment from disturbed ground is excessively mobilised through the minor channels network, this will be mitigated by temporary sediment control measures (e.g. geotextiles/straw bales/brush).
- The extent of all excavations would be minimised as far as is practicable. During construction activities, surface water flows will 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 will be passed through settlement/attenuation ponds and silt fences to capture sediments before release to the surrounding land away from watercourses. Measures will be taken to ensure water flowing away from dewatering areas does not re-enter excavations.
- Permanent relocation of soils will be re-instated with vegetation as soon as practicable.
- Where practicable, vegetation over the width of the cable trenches will be lifted as turfs, and replaced after trenching operations, to reduce disturbance.
- The movement of construction traffic will be controlled to minimise soil compaction and disturbance. Vehicle movements (to include HGVs and plant machinery) outside the defined tracks and hardstanding areas will be avoided where possible.

- Temporary peat stockpiles will be stored on a geotextile membrane and covered. Stored soils will be placed to minimise the potential for erosion distributed in flat areas away from watercourses.
- Trenching or excavation activities in open land will cease during periods of intense rainfall and temporary bunding will 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 will take place during low flow conditions where reasonably practical. If required, the drain will be dammed and water will be overpumped to isolate the construction zone. The construction period would be minimised as much as is reasonably practicable.
- All felling would be conducted in accordance with the UK Forest Standard¹⁴ and the Forest and Water Guidelines¹⁵.

Flood Mitigation

9.86 Temporary land take areas (construction compound with car parking, temporary storage area, temporary elements of crane hardstandings, welfare facilities etc.) will be fully reinstated following the construction period to reduce areas of semi-impermeable surfaces. Temporary land take areas will be cleared of hardcore, re-graded with soil to a natural profile and re-vegetated.

9.87 The site has been assessed for flood risk in line with Scottish Planning Policy, see Appendix 9.3. A sustainable approach to the drainage (SuDS) of the site has been assessed ensuring that offsite water quality is not compromised. Runoff and sediment control measures (as described in the previous section) would be implemented and the outline drainage design describes the design standards and drainage philosophy to be adopted, see Appendix 9.3.

Construction Pollution Prevention, Water Quality Monitoring and Emergency Response Plan

9.88 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 outline CDEMP. The outline CDEMP 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 Guidance for Pollution Prevention (GPP) published by SEPA. The following pollution control measures are explicitly incorporated into the outline CDEMP and deployed within all sub-catchments:

- No refuelling or storage of equipment, materials or chemicals will occur within the zones of contribution as shown on Figure 9.4. Equipment to contain and clean up any spills will be readily available at all times in this area.
- Equipment will be provided to contain and clean up any spills in order to minimise the risk of pollutants entering watercourses, lakes, GWDTE or flush areas.

¹⁴ Forestry Commission, 2017. UK Forest Standard. Fourth Edition.

¹⁵ Forestry Commission, 2011. Forest and Water Guidelines. Fifth Edition.

- Trenching or excavation activities in open land will cease during periods of intense rainfall. Temporary bunding will 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) will 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 will be confined to the designated fuelling areas and will be carefully controlled.
- Vehicles, plant machinery and equipment will be cleaned at designated washout areas located conveniently and within a controlled area of the site.
- All fuel and chemicals will be stored within appropriately specified containers and within specifically designed stores / storage areas and shall include appropriate measures to avoid spillages in line with the relevant legislation and as set out in the Cairn Duhie Pollution Prevention Plan.
- Concrete batching and any onsite washout will occur in designated 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 will be placed under standing machinery.
- All solid and liquid waste materials will be properly disposed of in controlled landfill sites away from the site.
- Routine mechanical maintenance of vehicles will be carried out offsite or in a suitable designated area of the site.
- There will be no unapproved discharge of foul or contaminated drainage from the site either to groundwater or any surface waters, whether direct or via soakaway.
- 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.

Operational Pollution Prevention, Water Quality Monitoring and Emergency Response Plan

- 9.89 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 will 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 will also be kept clear of debris.
 - If required, floating access tracks on peat may settle with time and therefore on-going repair and maintenance will be required.

- Vehicles, plant machinery and equipment will be cleaned at designated washout areas located conveniently and within a controlled area of the site.
- All fuel and chemicals will be stored within appropriately specified containers and within specifically designed stores / storage areas and shall include appropriate measures to avoid spillages in line with the relevant legislation and as set out in the Cairn Duhie Pollution Prevention Plan.
- Drip trays will be placed under standing machinery.
- Routine monitoring of surface water quality will be undertaken to demonstrate the absence of any ongoing impact arising from the operation of the proposed development.

Construction Effects

Predicted Construction Effects

Peat Stability

- 9.90 As the proposed development is located in an area where peat deposits are present, there is a risk of peat instability. A peat stability risk assessment was conducted to assess the risk of slope instability associated with the construction of the proposed development, as detailed in Appendix 9.2. 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.
- 9.91 The risk of peat instability increases where peat deposits are in excess of 1.5m deep. The peat depth surveys (conducted by MacArthur Green Ltd) revealed that 84% of probes recorded a peat depth of less than 1.5m. As detailed in Appendix 9.2, peat depths were interpolated for each turbine location. The Peat Landslide Hazard and Risk Assessment (Appendix 9.2) concludes that there is a negligible to low risk of peat instability over most of the site, although some areas of medium risk have been identified. For these areas, a hazard impact assessment was completed which concluded that, subject to the employment of appropriate mitigation measures, all these areas can be considered as an insignificant risk. Peat stability is thus not considered further.

Reduced Water Quality

- 9.92 During construction of the proposed development 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.
- 9.93 During the construction period, the covering vegetation would be disturbed within construction zones, exposing the underlying soils and greatly increasing 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.

- 9.94 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.
- 9.95 Runoff from the site construction zones in practice will 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. The design of the site layout has avoided crossing any natural watercourses, but the access track spur to Turbine 2 crosses a number of artificial land drains and historical peat cuttings. Artificial drains may offer a quick routing of potentially sediment laden runoff directly into watercourses.
- 9.96 These predicted effects have been reduced through the embedded runoff and sediment control measures, which incorporate additional sediment control measures to ensure that the existing land drains do not offer quick routing of runoff from construction areas directly into watercourses.
- 9.97 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.
- 9.98 As part of the proposed development, there is a requirement to fell some areas of broadleaved woodland, scattered broadleaved trees and scattered Scots Pine during construction. A description of the felling and replanting proposals is provided in Chapter 4: Development Description. The potential effects upon water quality during forestry operations is via sediment pollution and hydrochemical changes. Scientific research, adopted within the Forest and Water Guidelines¹⁶, 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 is not considered further.
- 9.99 Finally, there is 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. These potential effects during the construction period would be managed through the measures set out in the construction pollution, prevention, water quality monitoring and emergency response plan.
- 9.100 It is considered that these predicted construction impacts would have a small magnitude of change to the surface water quality as these cannot be completely mitigated. For the draining sub-catchments of high sensitivity, the significance of the predicted effect would therefore be **minor**, which is considered not significant.
- Private Water Supplies*
- 9.101 A number of PWS abstractions are located within the catchments draining the site, with full details presented in Appendix 9.4. The potential impact upon the PWS 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.
- 9.102 The water supplies potentially at risk from the proposed development are those with zones of contribution extending into the site or within 250m of the site. The Score Combined Supply, the Muckle Lyne Supply and Little Lyne Back-up Supply are within 250m of the site (refer to Figure 9.4). There is no potential impact upon the other PWS in the vicinity of the site identified in Appendix 9.4.
- 9.103 The Score Combined Supply serves the Score house and farm and Little Lyne farm and house. The supply consists of a spring collected in New Inn Wood. Although the Score Combined Supply is within 250m of the site, with the nearest infrastructure (Turbine 15) 800m from its source, its ZoC does not extend into the site. It is therefore not at risk from the proposed development.
- 9.104 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. The well is located at the boundary between superficial deposits of till draining the site and glaciofluvial deposits to the north. A 250m exclusion zone has been applied at the location of the source, as displayed in Figure 9.4. The well is located 900m at its closest point from any infrastructure (control building and substation), which are located on the interfluvium between the Stripe of Muckle Lyne and Stripe of Little Lyne catchments. 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

¹⁶ Forestry Commission, 2011. Forest and Water Guidelines. Fifth Edition.

receive drainage from Turbines 16, 14, 12, 9 and 8. The closest Turbine 16 is 1.3km south of the supply, which is approximately 1.7km via natural flow pathways into the Stripe of Muckle Lyne. Embedded mitigation measures will ensure that there will be no effect as a result of a reduction in water supply during the construction of the proposed development. With the embedded mitigation measures and given the distance from the abstraction location and shallow gradients of the site providing natural attenuation for any sediment-laden runoff generated during construction, it is considered that there would be a small magnitude of change to the quality of the Muckle Lyne water supply. The significance of the residual effect on this highly sensitive water supply would therefore be **minor**, which is considered not significant.

- 9.105 The Little Lyne Backup Supply is a rarely used backup supply servicing the Little Lyne house and farm (their primary water supply is 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 located at the boundary between superficial deposits of till draining the site and glaciofluvial deposits to the north. It is thought to abstract from superficial groundwater emerging at the edge of the till. A 250m exclusion zone has been applied at the location of the spring, as displayed in Figure 9.4. Although the ZoC intercepts the site boundary, there is no infrastructure located within the ZoC and the abstraction is located 900m at its closest point from any infrastructure (control building and substation located on the interfluvium between the Stripe of Muckle Lyne and Stripe of Little Lyne catchments). 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 development.

Loch Kirkcaldy and Lochan Tùtach

- 9.106 Loch Kirkcaldy trout loch and Lochan Tùtach are both outside of the drainage path of the site infrastructure and are therefore not at risk from the proposed development.

Groundwater Dependent Terrestrial Ecosystems and Peat Hydrology

- 9.107 Excavation of soil and bedrock during construction within the vicinity of a GWDTE (including peat) 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 and groundwater supplying the GWDTE. The 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. Contamination of groundwater or surface water may cause physical or chemical contamination to the GWDTE.
- 9.108 Figure 7.3 of Chapter 7: Ecology presents all the habitats identified during the National Vegetation Classification (NVC) survey. A range of NVC communities indicate that a wetland

is likely to be either highly groundwater dependent or moderately groundwater dependent depending on the hydrogeological setting. As part of the NVC survey, a number of habitats were identified as being dominantly or sub-dominantly a potential GWDTE, these are presented on Figure 9.3, and in greater detail in Figure 7.4 in Chapter 7: Ecology. The habitats are differentiated between those which are potentially highly and moderately groundwater dependant.

- 9.109 SEPA guidance¹⁷ states that GWDTEs within 100m from roads, tracks and trenches or within 250m from borrow pits and foundations should be identified, with details provided as to how these sensitive receptors will be protected. 100m and 250m buffers have been defined around the relevant infrastructure as presented in Figure 9.3. Only those GWDTE within the buffers are considered further, but the embedded mitigation will further protect habitats outside of these buffers.
- 9.110 Table 9.7 presents each of the identified potential highly and moderately dependent ecosystems within the buffer zones. Their likely dependence on groundwater based on the topographic and geological location is discussed. These habitats are likely to be supported by the high rainfall across the site, therefore appropriate drainage would ensure runoff is not diverted away from these habitats. The infrastructure location relative to the habitats and their ZoC is defined. Those habitats located down hydraulic gradient of the infrastructure are potentially at risk from a change in groundwater quantity and quality. Again, appropriate embedded drainage would ensure that the ZoC of the habitats would not be significantly reduced. Embedded mitigation would also ensure any runoff of reduced water quality would not reach these habitats. However, the construction could result in short term damage to the blanket bog in the vicinity of the temporary construction compound, batching plant, T11 and T7. This is considered to have a moderate magnitude of change to the GWDTE of high sensitivity, with a **moderate** significance of effect, which is significant. Direct habitat loss is considered with Chapter 7: Ecology, and therefore is not considered further here.

¹⁷ SEPA (2017). Land Use Planning System, SEPA Guidance Note 4: Planning advice on wind farm developments. Version 8.

Table 9.7: GWDTE within Buffer Zones

GWDTE (NVC Community)	Potential Groundwater Dependency /Dominance	Likely Groundwater Dependency	Potential Reduction in GWDTE ZoC with Embedded Mitigation
Blanket Bog (M19a/M25a/U5/W4/M6c) north of the site entrance	Highly / Sub-dominant	High rainfall, surface water and shallow groundwater within the till are likely to support this habitat.	T11 is located within 250m, but outside of its ZoC. The temporary construction compound is within 100m, within the ZoC of the south west part of the habitat. The batching plant is within 100m, but outside of the ZoC. A stretch of track is within this habitat. Embedded drainage around the compound and cross track drainage would ensure the ZoC would not be significantly reduced. Additional measures are required to provide additional protection.
Blanket Bog (M19/M25a/H9) south of T11	Moderately / Sub-dominant	High rainfall, surface water and shallow groundwater within the till are likely to support this habitat.	T11 is located at the downslope edge of this habitat, thus outside of its ZoC. Dewatering during foundation excavation may have a short-term localised reduction in groundwater levels. A stretch of track is within this habitat. Embedded cross track drainage would ensure the ZoC would not be significantly reduced. Additional measures are required to provide additional protection.
Patches of Wet Modified Bog (M25a/M19b) west and north of T11	Moderately / Dominant	High rainfall, surface water and shallow groundwater within the till are likely to support these habitats.	T11 is located within 250m and a section of track is within 100m, both within the ZoC of the bog and heath. Embedded drainage around T11 and cross track drainage would ensure the ZoC would not be significantly reduced.
Broad-Leaved Semi-Natural Woodland (W4) west of T11	Highly / Dominant		
Wet Dwarf Shrub Heath (M15/M15c/M19/M25a) north of T11	Moderately / Dominant		
Wet Dwarf Shrub Heath (M15/M15b/H9) east of T11	Moderately / Dominant	Located on the slopes of Cairn Duhie and underlain by till.	T10 is located within 250m, on the boundary of the habitats ZoC. T11 is located within 250m, but downslope of the habitats.

GWDTE (NVC Community)	Potential Groundwater Dependency /Dominance	Likely Groundwater Dependency	Potential Reduction in GWDTE ZoC with Embedded Mitigation
Acid Dry Dwarf Shrub Heath (H9/M15b) east of T11	Moderately / Sub-dominant	Habitats are likely to be supported by the high rainfall across the site, with limited groundwater within the upslope till.	Embedded drainage around T10 and cross track drainage would ensure the ZoC would not be significantly reduced.
Acid Neutral Flush (M6) west of T15	Highly / Dominant	High rainfall, surface water and shallow groundwater within the till are likely to support this habitat.	T15 is located within 250m, within the ZoC of the flush and bog. Embedded drainage around T15 and cross track drainage would ensure the ZoC would not be significantly reduced.
Blanket Bog (M19a/M25a) north west of T15	Moderately / Sub-dominant		
Wet Dwarf Shrub Heath / Blanket Bog Mosaic (M19b/M15c/M17) containing T13-T15 and the substation	Moderately / Sub-dominant	Located on the slopes of the northern shoulder of Cairn Duhie and underlain by till. Habitats are likely to be supported by the high rainfall across the site and are not supported by any significant groundwater.	Not Groundwater dependant. Embedded cross track and turbine area drainage would ensure runoff is not diverted away from downslope habitat. Dewatering during foundation excavation may have a short-term localised reduction in groundwater levels.
Wet Dwarf Shrub Heath (M25a/M15b/M15c/M15/M19) surrounding T13-T16	Moderately / Dominant		
Wet Heath/Acid Grassland Mosaic (M15c/U6b/M17b) north of substation	Moderately / Dominant		
Wet Dwarf Shrub Heath (M15b/M6c) east of T14	Highly / Sub-dominant	Located at the source of a tributary and along the Stripe of Muckle Lyne with a nearby flush noted in the target notes. Surface water and shallow groundwater within the till are likely to support these habitats.	T12 is just over 250m from the Heath and outside its ZoC. T14 is located within 250m along the drainage path towards these habitats. Located close to the crest of the hill, there is limited potential to reduce the ZoC. Embedded drainage around T14 and cross track drainage would ensure the ZoC is not reduced.
Acid Neutral Flush (M6/M6c) east of T14	Highly / Dominant		

GWDTE (NVC Community)	Potential Groundwater Dependency /Dominance	Likely Groundwater Dependency	Potential Reduction in GWDTE ZoC with Embedded Mitigation
Blanket Bog (M17b/M15c) north east of T12	Moderately / Sub-dominant	High rainfall, surface water and shallow groundwater within the till are likely to support this habitat.	T12 is located within 250m and stretch of track within 100m, all within the ZoC. Embedded drainage around T12 and cross track drainage would ensure the ZoC would not be significantly reduced.
Wet Dwarf Shrub Heath (M15b/M19b/M15c/M25a) in the vicinity T12, T9 and T5	Moderately / Dominant	Located on the peak and slopes of Cairn Duhie and underlain by till. Habitats are likely to be supported by the high rainfall across the site and are not supported by any significant groundwater. Support from shallow groundwater will increase towards the lower elevations.	The majority of these habitats are not groundwater dependant. Embedded cross track drainage and drainage around the turbine areas would ensure runoff is not diverted away from downslope habitat. Dewatering during foundation excavation and borrow pit excavation may have a short-term localised reduction in groundwater levels.
Acid Dry Dwarf Shrub Heath (H9/M19c/M15b/H10) between T5 and T6	Moderately / Sub-dominant		
Patches of Wet Modified Bog (M25a) south of T5 and T6	Moderately / Dominant		
Wet Dwarf Shrub Heath/Blanket Bog Mosaic (M15b/M19b/M6c) containing T6 and T8	Highly / Sub-dominant		
Wet Modified Bog (M25a/M15b) north east of T1	Moderately / Dominant		
Wet Dwarf Shrub Heath (M15/M19/M15b/M19a) containing T1, T3 and T4	Moderately / Dominant		
Wet Dwarf Shrub Heath (M15c/M19/M25a/M15/M19) containing T10 and the borrow pit search area	Moderately / Dominant		
Wet Modified Bog (M25a) south of T2	Moderately / Dominant		
Broad-Leaved Semi-Natural Woodland (W4c) south of T2	Highly / Dominant	Located downslope of superficial peat, shallow groundwater from the peat is likely to support these habitats.	T2 is located within 250m, within the ZoC. Embedded drainage around T2 and cross track drainage would ensure the ZoC would not be significantly reduced.

GWDTE (NVC Community)	Potential Groundwater Dependency /Dominance	Likely Groundwater Dependency	Potential Reduction in GWDTE ZoC with Embedded Mitigation
Patches of Broad-Leaved Semi-Natural Woodland (W4c/M20/W4c/M19b) west of T7	Highly / Dominant	Located downslope of superficial peat, shallow groundwater from the peat is likely to support these habitats.	T7 is located within 250m of these habitats, but outside of their ZoC. Thus the ZoC would not be reduced.
Wet Modified Bog (M25a) west of T7	Moderately / Dominant		
Blanket Bog (M19b/M25a/M20) south of the site entrance	Moderately / Sub-dominant	High rainfall, surface water and shallow groundwater within the till are likely to support this habitat.	T7 is located within 250m, within the ZoC. The temporary construction compound, batching plant and stretch of track are also within this habitat. Embedded drainage around T7, the compound and plant and cross track drainage would ensure the ZoC would not be significantly reduced. Additional measures are required to provide additional protection.

Proposed Additional Mitigation

Protection of Groundwater Dependent Terrestrial Ecosystems (GWDTEs) During Construction

- 9.111 Construction of the temporary construction compound, batching plant, T11 and T7 and connecting stretches of track from the site entrance located within and adjacent to the blanket bog, require the following additional measures to mitigate any potential impacts on the GWDTE habitats in these areas:
- Identify flush areas and natural depressions.
 - Avoid diverting flows away from the GWDTEs by drainage channels.
 - Provide pipes and/or drainage matting to ensure hydraulic conductivity is maintained across the GWDTE.

Residual Construction Effects

Water Quality

- 9.112 Additional mitigation measures are not required, therefore there would be a residual small magnitude of change. For the draining sub-catchments of high sensitivity, the significance of the residual effect would therefore be **minor**, which is considered not significant.

Private Water Supplies

- 9.113 The significance of the residual effect on Muckle Lyne Supply remains **minor** as no additional mitigation is required, which is considered not significant. There is no residual effect on the other PWS.

Groundwater Dependent Terrestrial Ecosystems and Peat Hydrology

- 9.114 Where excavations occur within a habitat or in close proximity up hydraulic gradient of the GWDTE (including peat), there is potential to reduce the ZoC supplying the ecosystem during construction. The potential reduction in the ZoC to the habitats have been significantly decreased through embedded mitigation measures and consideration within the drainage design (see Appendix 9.3) to ensure that the ZoC is not significantly reduced. Embedded pollution prevention and runoff/sediment control measures have reduced the potential impact of reduced water quality. Additional mitigation measures are to be incorporated during the construction of the temporary construction compound, batching plant, T11 and T7 and connecting stretches of track from the site entrance located within and adjacent to the blanket bog. With these additional mitigation measures, the construction is considered to have a small magnitude of change to the GWDTE of high sensitivity, with a **minor** significance of the residual effect, which is not significant.

Operational Effects

Predicted Operational Effects

Reduced Water Quality

- 9.115 The embedded design of access tracks and cable trenches will prevent preferential routing, which could lead to scour of track surfaces and erosion of the cable trenches generating sediment. The embedded track drainage will prevent gulying of the soils in the vicinity of tracks and the subsequent routing of sediment and water of reduced water quality to the stream network draining the site. Whilst the tracks have been designed to avoid any crossings of watercourses, a number of artificial land drains will be crossed by the access track spur to Turbine 2. The embedded mitigation will ensure the land drain crossings are appropriately sized with scour prevention to prevent scour and sediment generation, which could change the catchment water quality. These long-term potential impact on water quality are considered to have a negligible magnitude of change to the surface water quality.
- 9.116 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 outline CDEMP (Appendix 4.2).
- 9.117 Finally, the potential for accidental spillage/loss of lubricants and other chemicals during site operation adversely affecting the water quality, 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.

- 9.118 For the draining sub-catchments of high sensitivity, the significance of the operational effect would therefore be **negligible**, which is considered not significant.

Modifications to the Catchment and In-stream Hydrology

- 9.119 As stated in the Baseline Conditions section, the site is at 'little or no risk' of fluvial flooding. The majority of the site is also shown to be at 'little or no risk' of flooding from pluvial sources. All of the infrastructure of the proposed development will be located outside the small isolated areas of high, medium and low risk of pluvial flooding.
- 9.120 Outwith the site, an increase in the risk of flooding to the draining burns and their neighbouring properties from the proposed development would only arise if there is an increase in impermeable surfaces across the site; and this has been addressed within the SuDS outline drainage design (see Appendix 9.3).
- 9.121 The extent of long-term and temporary land take areas is presented in Chapter 4: Development Description. The long-term land take consists of a combination of impervious foundations and semi-permeable tracks and other hardstanding areas. 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 0.1km² (10.52 ha) for the life of the project (see Chapter 4: Development Description for further details).
- 9.122 Reduction in infiltration 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. 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 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^{7,18} 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. The embedded drainage design also ensures runoff to the surrounding land would be attenuated to Greenfield Rates, as detailed within Appendix 9.3. Therefore, there would be no change to downstream flood risk.

18 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

9.123 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

9.124 During the operation of the proposed development, the potential impact upon the Muckle Lyne Supply would be as a result of direct impacts on the water quality through enhanced erosion, hydrochemical changes and accidental spillage/loss during operational maintenance. Following incorporation of the site wide mitigation measures, the operational and long-term impacts of the proposed development on the Muckle Lyne Supply would be negligible. It is therefore considered that the residual impact upon the Muckle Lyne Supply of high sensitivity would be **negligible**, which is not significant.

9.125 There are no potential operational impacts upon the remaining PWS identified in Appendix 9.4.

Groundwater Dependent Terrestrial Ecosystems and Peat Hydrology

9.126 The access tracks have the potential to reduce cross track flow, which could lead to waterlogged areas upslope of the track and the drying of the areas downslope. Where floating tracks are required, the weight of the floating tracks could compact any underlying localised peat, resulting in reduced hydraulic conductivity (and potential collapse of any macropores present). The weight of the floating tracks could 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. The potential for reduced cross track sub-surface flows through the peat and subsequent drying and oxidation of peat deposits has been reduced to a small magnitude of change through the embedded drainage design mitigation and floating tracks).

9.127 A detailed analysis of the potential impacts on GWDTE (including peat) is presented within the Predicted Construction Effects section. During the operation of the proposed 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 9.7. Appropriate cross drainage would be required to ensure runoff and subsurface flows draining to the identified GWDTE is maintained.

9.128 The operational pollution prevention and emergency response plan would ensure that there is a negligible magnitude of change to water quality.

9.129 It is considered that there would be a negligible magnitude of change to the GWDTE of high sensitivity, thus a **negligible** significance of effect, which is not significant.

Carbon Balance

9.130 As detailed in Appendix 9.5, the proposed wind farm is likely to produce a certain amount of CO₂ 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 one year of operation, through displacement of fossil fuel generated electricity in the National Grid.

Proposed Additional Mitigation

9.131 No additional mitigation is proposed beyond the embedded mitigation.

Residual Operational Effects

Water Quality

9.132 For the draining sub-catchments of high sensitivity, the significance of the residual effect remains **negligible**, which is considered not significant.

Modifications to the Catchment and In-stream Hydrology

9.133 The significance of the residual effect for the draining sub-catchments of high sensitivity is **none**, thus not significant.

Private Water Supplies

9.134 The residual impact upon the Muckle Lyne Supply of high sensitivity would be **negligible**, which is not significant. There would be no residual effect upon the remaining PWS.

Groundwater Dependent Terrestrial Ecosystems and Peat Hydrology

9.135 The significance of the GWDTE residual effect remains **negligible**, which is not significant.

Cumulative Effects

9.136 A hydrological cumulative impact assessment is based upon other developments located within the same catchments as the site. Chapter 5: Landscape and Visual Impact Assessment presents a number of operational and consented wind farms, as well as those in appeal/public inquiry or design/scoping. Of those, none are within the sub-catchments draining the site.

9.137 Four of the developments, Hill of Glaschyle (operational), Berry Burn (operational), Clash Gour (appeal/public inquiry) and Ourack (design/scoping), also drain to the River Findhorn via the Dorback Burn. The greatest potential disturbance to the Dorback Burn would be if Cairn Duhie, Clash Gour and Ourack were constructed simultaneously. Any cumulative effects would occur at the confluence where the watercourses draining these developments meet. The catchment area of the Dorback Burn at this confluence (NJ010472) is 162km², thus any potential impacts would be significantly diluted. Therefore, there would be no cumulative effects from these developments.

9.138 Five operational wind farms (Tom nan Clach, Moy, Kyllachy, Farr and Dunmaglass) and one consented (Aberarder) are located upstream of the site and also drain to the River Findhorn. The total catchment area for the River Findhorn where any cumulative effects could occur (NJ000498) is 595km². Thus any potential impacts would be significantly diluted, such that

there would be no cumulative effects from the construction and operation of these developments.

9.139 The remaining developments listed in Chapter 5: Landscape and Visual Impact Assessment are not hydrologically connected to the proposed development and are not be considered further.

Interrelationship between Effects

9.140 This chapter discusses the direct residual effects of the proposed 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 PWS and GWDTE. The residual effects on aquatic ecology are presented within Chapter 7: Ecology.

Summary

9.141 Table 9.8 presents a summary of residual effects. The assessment concludes that the construction, operation and long-term effect of the proposed development are Minor or Negligible which is considered not to be significant.

Table 9.8: Summary of Residual Effects

Likely Significant Effect	Mitigation	Means of Implementation	Residual Effect
Construction			
Reduced water quality as a result of increased sediment loads and acidification within runoff from disturbed ground, spoil heaps and excavations (Minor).	Layout has been designed to ensure construction is away from watercourses, and implementation of the runoff and sediment control measures.	Outline CDEMP	Minor
Reduced water quality as a result of accidental spillage/loss of chemicals and other construction materials (Minor).	Construction pollution prevention, water quality monitoring and procedures in the event of a spill plan.	Outline CDEMP	Minor
Reduced water quality of the PWS receiving runoff from the site (Minor).	No construction will take place within the 250m 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.	Outline CDEMP	Minor

Likely Significant Effect	Mitigation	Means of Implementation	Residual Effect
Disconnection of water supply to GWDTE (Moderate).	Layout has been designed to minimise, where possible, infrastructure within 100m from roads, tracks and trenches or 250m from foundations and borrow pits. site drainage design and implementation of the runoff and sediment control measures. Additional measures have been incorporated for the protection of the blanket bog in the vicinity of the temporary construction compound, batching plant, T11 and T7 and connecting stretches of track.	Outline CDEMP	Minor
Operation			
Reduced water quality as a result of accidental spillages/loss of chemicals or hydrocarbons (Negligible).	Operational pollution prevention, water quality monitoring and emergency response plan.	Operational pollution prevention, water quality monitoring and emergency response plan	Negligible
Reduced water quality and quantity of the PWS receiving runoff from the site (Negligible).	Operational pollution prevention, water quality monitoring and emergency response plan. Layout design and appropriate site drainage measures and site drainage design	Operational pollution prevention, water quality monitoring and emergency response plan	Negligible
Changes to runoff and peak flow through increased impervious surfaces across catchments (Negligible).	Appropriate Drainage Design.	Outline CDEMP	None
Erosion of site infrastructure and surrounding soils and peat. Drying and oxidation of peat deposits leading to peat degradation and further enhanced erosion (Negligible).	Layout design and site drainage design measures.	Outline CDEMP	Negligible

Likely Significant Effect	Mitigation	Means of Implementation	Residual Effect
Disconnection of water supply to GWDTE (Negligible).	Layout has been designed to minimise, where possible, infrastructure within 100m from roads, tracks and trenches or 250m from foundations and borrow pits. site drainage design to ensure cross track drainage.	Outline CDEMP and Layout Design Constraints	Negligible

Chapter 10: Traffic and Transport

10. Traffic and Transport

Introduction

- 10.1 This chapter considers the likely significant effects on receptors along the transport routes resulting from vehicle movements associated with the construction and operation of the proposed development. The specific objectives of the chapter are to:
- review the relevant policy and legislative framework;
 - describe the baseline transport conditions;
 - describe the assessment methodology and significance criteria used in undertaking the assessment;
 - describe the likely potential effects, including direct, indirect and cumulative effects;
 - describe the mitigation measures proposed to address likely significant effects; and
 - assess the residual effects remaining following the implementation of mitigation.
- 10.2 The assessment has been carried out by Gordon Buchan BEng (Hons), MSc, CMILT, MCIHT, Divisional Director of Pell Frischmann. He has over 24 years of undertaking the transport assessments associated with new developments and has worked on renewable energy and energy distribution projects across the UK, Ireland and Northern Europe.
- 10.3 Effects have been considered in accordance with Institute of Environmental Assessment (now Institute of Environmental Management and Assessment (IEMA)) Guidelines for the Environmental Assessment of Road Traffic (1993). The document is referred to as the IEMA Guidelines in this chapter.
- 10.4 The chapter should be read in conjunction with Appendix 10.1: Transport Assessment and Appendix 10.2: Construction Traffic Management Plan. An assessment of the bridges on the turbine delivery route has also been undertaken and the findings are set out in Appendix 10.3: Bridge Assessment Report.
- 10.5 Figures 10.1, 10.2 and 10.3 are referenced in the text where relevant.

Planning

- 10.6 An overview of relevant transport planning policies has been undertaken and is summarised below for national and local government policies.
- Planning Advice Note (PAN) 75 (2005)**
- 10.7 Planning Advice Note (PAN) 75: Planning for Transport provides advice on the requirements for Transport Assessments. The document notes that:
- “...transport assessment to be produced for significant travel generating developments. Transport Assessment is a tool that enables delivery of policy aiming to integrate transport and land use planning”.*

“All planning applications that involve the generation of person trips should provide information which covers the transport implications of the development. The level of detail will be proportionate to the complexity and scale of the impact of the proposal...”

“For smaller developments the information on transport implications will enable local authorities to monitor potential cumulative impact and for larger developments it will form part of a scoping exercise for a full transport assessment. Development applications will therefore be assessed by relevant parties at levels of detail corresponding to their potential impact”.

Transport Assessment Guidance (2012)

- 10.8 Transport Scotland’s (TS) Transport Assessment Guidance was published in 2012. It aims to assist in the preparation of Transport Assessments (TA) for development proposals in Scotland such that the likely transport effects can be identified and dealt with as early as possible in the planning process. The document sets out requirements according to the scale of development being proposed.
- 10.9 The document notes that a TA will be required where a development is likely to have significant transport effects but that the specific scope and contents of a TA will vary for developments, depending on location, scale and type of development.

Onshore Wind Turbines; Online Renewables Planning Advice (May 2014)

- 10.10 The most recent Scottish Government advice note regarding onshore wind turbines was published in 2014. In terms of road traffic impacts, the guidance notes that in siting wind turbines close to major roads, pre-application discussions are advisable as this is important for the movement of abnormal indivisible loads during the construction period, ongoing planned maintenance and for decommissioning (if applicable).

Highland-wide Local Development Plan (2012)

- 10.11 Whilst The Highland Council (THC) has begun the process of reviewing the Highland-wide Local Development Plan (HwLDP), this has been postponed due to the publication of the Planning (Scotland) Act 2019 which outlined changes to the content of LDPs and how they are prepared. Therefore, the HwLDP adopted in April 2012 remains THC’s established planning policy.
- 10.12 The LDP does not contain any specific policy guidance for the proposed development. However, Policy 56 is relevant with regards general transport policy. The relevant transport elements from this policy are:

“Development proposals that involve travel generation must include sufficient information with the application to enable the Council to consider any likely on- and off- site transport implications of the development and should:

- *incorporate appropriate mitigation on site and/or off site, provided through developer contributions where necessary, which might include improvements and enhancements to the*

walking/cycling network and public transport services, road improvements and new roads; and

- incorporate an appropriate level of parking provision, having regard to the travel modes and services which will be available and key travel desire lines and to the maximum parking standards laid out in Scottish Planning Policy or those set by the Council.

When development proposals are under consideration, the Council's Local Development Strategy will be treated as a material consideration.

The Council will seek the implementation and monitoring of Green Travel Plans in support of significant travel generating developments".

Guidance on the Preparation of Transport Assessments (2014)

10.13 THC has prepared guidance on how Transport Assessments (TA) should be prepared for development sites within The Highlands. The guidance was published by THC in November 2014.

10.14 This assessment has noted the guidelines and has provided the required assessment.

Scope of Assessment

Effects Assessed in Full

10.15 The assessment has fully considered the transport and access issues arising from the construction phase of the proposed development. The study has considered the following temporary effects:

- direct effects during construction on traffic flows in the surrounding study area;
- direct effects upon local road users; and
- effects upon local residents of an increase in construction traffic.

10.16 Where the effects meet the criteria set out in the IEMA guidance, a review of the effects on severance, driver delay, pedestrian delay, pedestrian amenity, fear and intimidation and accidents / road safety has been undertaken.

Effects Scoped Out

10.17 The traffic effects during the operational phase of the proposed development are likely to be insignificant as expected traffic flows will be less than two vehicle movements per week, far below the recognised thresholds for triggering a formal transport assessment. As such, the effects during the operational phase are scoped out of the assessment.

10.18 The traffic effects during the decommissioning phase can only be fully assessed closer to that period. As elements of the development are likely to remain in-situ (such as cable trenches, access tracks, etc.), the traffic flows associated with the decommissioning works will be lower than those associated with the construction phase. The construction phase therefore represents a worst-case assessment. As such, no further assessment of the decommissioning phase has been undertaken.

10.19 THC has agreed that the operational and decommissioning phases can be scoped out of detailed assessment.

Assessment Methodology

Legislation and Guidance

Legislation

10.20 The assessment has been undertaken in accordance with the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017.

Guidance

10.21 This assessment has been carried out in accordance with the principles outlined in the following documents:

- Institute of Environmental Assessment, Guidelines for the Environmental Assessment of Road Traffic (1993);
- Institution of Environmental Management and Assessment (IEMA) Guidelines for Environmental Impact Assessment (2005);
- Table 2.2 of Volume 11, Section 2, Part 5 of the Design Manual for Roads and Bridges (DMRB) (Highways Agency), 2008; and
- The Highland Council, Guidance on the Preparation of Transport Assessments.

Consultation

10.22 In undertaking the assessment, consideration has been given to the scoping responses and other consultation undertaken as detailed in **Table 10.1** below.

Table 10.1: Consultation Responses

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action
The Highland Council (THC)	Formal Scoping Consultation	THC confirmed that the assessment methodology is acceptable.	Noted
		THC would not support Route 3 (via the A95 and Dava Moor) being used for other construction-related traffic movements.	Only Abnormal Indivisible Loads (AIL) traffic would be allowed on Route 3. A route assessment for AIL traffic has been undertaken.
		The route from Inverness Harbour to the strategic trunk road network must be assessed.	This assessment is included in the Route Survey Reports, contained within Appendix 10.1.

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action
		The physical condition of the roads and their capability to safely accommodate the proposed vehicle numbers and loadings without generating new road safety hazards should be considered in the assessment.	This is considered in this Chapter and in Appendix 10.1.
		<p>Transport Planning would expect that committed developments that are within the planning system that could generate measurable vehicle trips onto the proposed access route options set forth for the proposed development should be included within the assessment. These include:</p> <p>Upper Remore Quarry (18/05787/FUL);</p> <p>Kingsteps Housing Development in Nairn (17/05667/FUL);</p> <p>A96 Dualling Scoping (16/00529/SCOP);</p> <p>Tom nan Clach Windfarm (15/03286/FUL);</p> <p>18 new houses, Dulnain Bridge (18/02551/FUL); and</p> <p>New distillery at Carrbridge (19/02681/FUL but called in by CNPA).</p>	<p>The only committed development noted that is likely to affect the transport network within the study area is the Kingsteps development. The Highland Council planning portal does not contain any traffic flow data for this scheme, therefore an estimate of traffic flows that may interact with construction traffic has been made for the purposes of the assessment.</p> <p>Traffic growth factors are being applied to develop future year flow data and this will provide a degree of accommodation for new development traffic on the network.</p> <p>Traffic flows from non-consented schemes are not included in the assessment as it is considered that inclusion of these traffic flows would dilute the potential traffic impact associated with Cairn Duhie Wind Farm, resulting in an underreporting of the impact that the proposed development may have</p>

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action
			<p>on the study area network.</p> <p>Should these schemes be consented within the timescale of construction activities occurring for the proposed development, then a traffic management plan could be introduced, in the unlikely event that a significant traffic issue could occur on the network.</p>
		If works associated with the Tom Nan Clach scheme are still ongoing, a suitable control survey should be considered on the A938, west of the junction with the B9007.	The Applicant understands that works at Tom Nan Clach are now completed.
		Transport Scotland should be consulted regarding any upgrades to the trunk road network.	Transport Scotland has been contacted as part of the consultation process and advised that they have no comments to make.
		It is likely that the Council will require the developer to enter into a Wear and Tear Agreement, with a suitable financial road bond being provided.	The Applicant will engage in further discussions with THC in relation to a Wear and Tear Agreement post consent.
Moray Council	Formal Scoping Consultation	The traffic and transport chapter should be supported by a Construction Method Statement and Construction Traffic Management Plan focussing on the delivery of abnormal roads and the impact of HGV construction traffic on the local roads network. A detailed route survey should be undertaken. This will involve the need for swept path analysis and test runs once the upper limits of blade lengths	<p>An outline Construction Traffic Management Plan is provided within Appendix 10.1.</p> <p>Appendix 10.1 also contains the Route Survey Review report outlining the necessary route works.</p>

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action
		etc is known. The route survey, if affecting roads within Moray Council, should detail any alterations, roadside tree felling, temporary measures proposed to public road network to facilitate delivery.	
		If it is intended to use existing quarries within Moray, the amount of material required, and the delivery routes to the site should be detailed within any CMS or CTMP.	Details on the movement of loads is provided. It is also noted that an onsite borrow pit will also be used for stone.
East Nairnshire Community Council	Formal Scoping Consultation	Suggest that ATC surveys will need to be carried out during peak tourism season as there is a huge increase in flow along both the A939 and the B9007 and surveys outwith this period would not be representative.	Traffic surveys should only be undertaken in neutral months. Surveys in this period would reduce the percentage impact of traffic on the network and would underestimate the potential effects.
		The proposal to bring construction HGVs and the abnormal loads up the Glen to the Village and to route them on a new track across the field in close proximity to the lower village properties would result in noise, vibration and dust for residents during construction, and could result in future flooding. Recommend that this needs further study and consultation if taken forward. All of the Village's main services (water, electricity and telephone) are routed and cabled through this field.	No general construction traffic would use this route. The impact assessment considers the AIL traffic on this route.
		Note that at snow gates on B9007, regular access will need to be maintained for residents from late July through August and into September due to the presence of beehives managed by local residents.	No impediment to accessing the beehives is envisaged.

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action
Transport Scotland	Formal Scoping Consultation	The proposed assessment methodology is appropriate.	Noted.
		Traffic survey data locations for surveys is considered acceptable. Should include A95 and A96.	Noted and included in the assessment.
		The methods adopted to assess the likely traffic and transportation impacts on trunk road traffic flows and transportation infrastructure should comprise: 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; Review of the development proposals to determine the predicted construction and operational requirements; and Assessment of the significance of predicted impacts from these transport requirements, taking into account impact magnitude (before and after mitigation) and baseline environmental sensitivity.	Noted and included in the assessment.
		A full Abnormal Loads Assessment should be provided as a technical appendix to the EIA Report and should identify key pinch points on the trunk road network as well as swept path analysis.	These are appended to the Appendix 10.1.

Baseline Characterisation

Study Area

- 10.23 The study area is shown on Figure 10.1 and includes local roads that are likely to experience increased traffic flows resulting from the proposed development. The geographic scope was determined through a review of Ordnance Survey (OS) plans and an assessment of the potential origin locations of construction staff and supply locations for construction materials.

- 10.24 The proposed development would take access directly from a new priority junction located on the A939.
- 10.25 Access for construction materials would be predominantly from the north with quarried materials likely to come either from suppliers located on the A939 and A96 corridors. Materials for the onsite batching of concrete will also arrive from the north and will use the A939 to access the construction site.
- 10.26 Abnormal loads associated with the wind turbines will depart Inverness Harbour and travel to site via the A9, A95, A938, B9007 and A939 as shown on Figure 10.2. Details of the access route are provided in Appendix 10.1.
- 10.27 The study area for the assessment has therefore been assumed to be:
- A939 from the site access junction through to Nairn;
 - A96 within Nairn and heading west through to Inverness;
 - A9 at Raigmore, Inverness;
 - A9 at its junction with the A95 to the north of Aviemore;
 - A95 between Aviemore and Dulnain Bridge;
 - A938 between Dulnain Bridge and the B9007; and
 - B9007.
- 10.28 This study area includes areas of material supply (quarries, etc), the site access junction, the trunk road network and the construction material and abnormal load delivery routes. It is also of sufficient size to include the main areas of workforce accommodation during the construction period.
- Desk Study**
- 10.29 The desk study included reviews and identification of the following:
- relevant transport planning policy;
 - accident data;
 - sensitive locations;
 - any other traffic sensitive receptors in the area (core paths, routes, communities, etc.);
 - ordnance Survey (OS) plans;
 - potential origin locations of construction staff and supply locations for construction materials to inform extent of local area roads network to be included in the assessment; and
 - constraints to the movement of Abnormal Indivisible Loads (AIL) through a Route Survey including swept path assessments.
- Field Survey**
- 10.30 Field surveys were also undertaken and comprised two detailed site visits to review the access routes and local road network, the most recent being undertaken in July 2020.

- 10.31 Due to the ongoing effects of travel restrictions associated with the COVID 19 pandemic, it has not been possible to undertake representative traffic surveys for use in the assessment.

Assessing Significance

Sensitivity Criteria

- 10.32 The IEMA Guidelines for Environmental Impact Assessment (2005) notes that the separate Guidelines for the Environmental Assessment of Road Traffic (1993) document should be used to characterise the environmental traffic and transport effects (offsite effects) and the assessment of significance of major new developments. The guidelines intend to complement professional judgement and the experience of trained assessors.
- 10.33 In terms of traffic and transport impacts, the receptors are the users of the roads within the study area and the locations through which those roads pass.
- 10.34 The IEMA Guidelines includes guidance on how the sensitivity of receptors should be assessed. Using that as a base, professional judgement was used to develop a classification of sensitivity for users based on the characteristics of roads and locations. This is summarised in Table 10.2.

Table 10.2: Classification of Receptor Sensitivity

Receptor	Sensitivity			
	High	Medium	Low	Negligible
Users of Roads	Where the road is a minor rural road, not constructed to accommodate frequent use by HGVs. Includes roads with traffic control signals, waiting and loading restrictions, traffic calming measures.	Where the road is a local A or B class road, capable of regular use by HGV traffic. Includes roads where there is some traffic calming or traffic management measures.	Where the road is Trunk or A-class, constructed to accommodate significant HGV composition. Includes roads with little or no traffic calming or traffic management measures.	Where roads have no adjacent settlements. Includes new strategic trunk roads that would be little affected by additional traffic and suitable for Abnormal Loads and new strategic trunk road junctions capable of accommodating Abnormal Loads.
Users/ Residents of Locations	Where a location is a large rural settlement containing a high number of community and public services and facilities.	Where a location is an intermediate sized rural settlement, containing some community or public facilities and services.	Where a location is a small rural settlement, few community or public facilities or services.	Where a location includes individual dwellings or scattered settlements with no facilities.

10.35 Where a road passes through a location, users are considered subject to the highest level of sensitivity defined by either the road or location characteristics.

Magnitude of Effect

10.36 The following rules, also taken from the IEMA Guidelines are used to determine which links within the study area should be considered for detailed 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.

10.37 The IEMA Guidelines identify the key impacts that are most important when assessing the magnitude of traffic impacts from an individual development:

- Severance: the IEMA Guidance states that “*severance is the perceived division that can occur within a community when it becomes separated by a major traffic artery*”. Further, “*Changes in traffic of 30%, 60% and 90% are regarded as producing ‘slight’, ‘moderate’ and ‘substantial’ [or minor, moderate and major] changes in severance respectively*”. However, the Guidelines acknowledge that “*the measurement and prediction of severance is extremely difficult*”.
- Driver delay: the IEMA Guidelines note that these delays are only likely to be “*significant [or major] 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 major when the traffic on the network surrounding the development is already at, or close to, the capacity of the system. An increase in total traffic of approximately 30% can double the delay experienced by pedestrians attempting to cross the road and would be considered major.
- Pedestrian amenity: the IEMA Guidelines 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. It is therefore considered that a change in the traffic flow of -50% or +100% would produce a major change in pedestrian amenity.
- Fear and intimidation: there are no commonly agreed thresholds for estimating levels of fear and intimidation, from known traffic and physical conditions. However, as the impact is considered to be sensitive to traffic flow, changes in traffic flow of 30%, 60% and 90% are regarded as producing minor, moderate and major changes respectively.
- Accidents and safety: professional judgement has been used to assess the implications of local circumstances, or factors which may elevate or lessen risks of accidents.

10.38 While not specifically identified, as more vulnerable road users, cyclists are considered in similar terms to pedestrians.

Significance Criteria

10.39 To determine the overall significance of effects, the results from the receptor sensitivity and magnitude of change assessments are correlated and classified using a scale set out in Table 2.4 of Volume 11, Section 2, Part 5 of the Design Manual for Roads and Bridges (DMRB) and summarised in Table 10.3.

Table 10.3: Significance of Effects

Receptor Sensitivity	Magnitude of Impacts			
	Major	Moderate	Minor	Negligible
High	Major	Major/Moderate	Moderate/Minor	Minor
Medium	Major/Moderate	Moderate	Minor	Minor / Negligible
Low	Moderate/Minor	Minor	Minor	Minor / Negligible
Negligible	Minor	Minor	Minor / Negligible	Negligible

10.40 In terms of the EIA Regulations, effects would be considered of significance where they are assessed to be Major or Moderate. Where an effect could be one of Major/Moderate or Moderate/Minor significance, professional judgement would be used to determine which option should be applicable.

Assessment Limitations

10.41 The assessment is based upon average traffic flows in one month periods. During the month, activities at the site may fluctuate between one day and another and it is not possible to fully develop a day by day traffic flow estimate as no Balance of Plant (BoP) contractor has been appointed and external factors can impact upon activities on a day by day basis (weather conditions, availability of materials, time of year, etc).

10.42 The assessment used however does provide sufficient information to allow an informed decision to be taken with respect to the identification and assessment of likely significant impacts relating to transport matters.

10.43 It should be noted that, as noted above, due to travel restrictions associated with the Covid 19 outbreak, the collection of meaningful traffic count data within a neutral flow period has not been possible. Traffic data used in the assessment has therefore been sourced from historic traffic count data provided by the UK Department for Transport (DfT).

Baseline Conditions

10.44 As noted above, traffic data used in the assessment has been sourced from historic data provided by the DfT. The locations of the traffic count sites relevant to this assessment are summarised below:

- A939 to the south of the Site Access;
- A939 North of Ferness;

- A939 South of Nairn;
- A96 East of Nairn;
- A96 West of Nairn;
- A9 at Raigmore;
- A9 south of Aviemore;
- A95 at Dulnain Bridge; and
- A938 at Dulnain Bridge.

10.45 The traffic data allowed the traffic flows to be split into vehicle classes. The data was summarised into Cars/Lights and HGVs (all goods vehicles >3.5 tonnes gross maximum weight).

10.46 Table 10.4 summarises the Annual Average Daily Traffic (AADT) traffic data collected at the nine sites for 2018.

Table 10.4: Existing Traffic Flow (2018 Survey Data)

Survey Location	Cars & Lights	HGV	Total
A939 Site Access	360	34	394
A939 North of Ferness	582	89	671
A939 South of Nairn	887	58	945
A96 East of Nairn	10590	646	11236
A96 West of Nairn	12184	1259	13443
A9 at Raigmore	34311	2300	36611
A9 south of Aviemore	7042	1007	8049
A95 at Dulnain Bridge	3552	576	4128
A938 at Dulnain Bridge	2062	139	2201

10.47 Road traffic accident data for the three-year period commencing 1 January 2017 through to the 31st December 2019 was obtained from the online resource crashmap.co.uk which uses data collected by the police about road traffic crashes occurring on British roads where someone is injured.

10.48 A summary analysis of the incidents indicates that:

- 24 accidents were recorded within the area covered by the A939, B9007, A95, A938, the A9 / A95 interchange and within 2km of Nairn on the A96.
- Of these 24 accidents, none resulted in a fatality, although three resulted in a serious injury. The remaining 21 accidents were classified as slight (damage only incidents).
- Only three accidents were recorded on the A939, none involving an HGV.
- The majority of accidents (eight slight and two serious) occurred on the A95 between Aviemore and Dulnain Bridge.

- The junction of the A9 and A95 recorded one serious and four slight accidents.
- Seven HGV were recorded in accidents in the review period, although all were on trunk roads (A9, A96 and A95).
- Pedal cycles and motorcycles were involved in one accident each.
- Young drivers were involved in one serious and four slight accidents, all clustered on the A95.
- Motorcycles accounted for one slight and one serious accident.

10.49 The local road network within the study area has a low accident rate and no HGV incidents, despite the roads being used for quarry and timber traffic.

10.50 The Highland Council Core Path Map does not show any core paths on the A939. (www.highland.maps.arcgis.com/apps/webappviewer/). Two core paths originate from the A939 in Nairn (NA04.06); however, these are on the west of the road and provide local connections to the River Nairn.

10.51 The Sustrans National Cycle Route (NCR) map (<https://www.sustrans.org.uk/national-cycle-network/>) does not show any national routes on the A939 (other than a very short section of 0.3 miles in length between the Cemetery and Househill in Nairn), A938 or B9007.

Future Baseline

10.52 Construction of the project is due to commence during 2023 if consent is granted.

10.53 To assess the likely effects during the construction phase, base year traffic flows were determined by applying a National Road Traffic Forecast (NRTF) low growth factors to the surveyed and obtained traffic flows.

10.54 The NRTF low growth factor for 2018 to 2023 is 1.035. This factor was applied to the 2018 survey data to estimate the 2023 Base traffic flows shown in Table 10.5.

Table 10.5: 2023 Baseline Traffic Flow

Survey Location	Cars & Lights	HGV	Total
A939 Site Access	373	35	408
A939 North of Ferness	602	92	694
A939 South of Nairn	918	60	978
A96 East of Nairn	10961	669	11629
A96 West of Nairn	12610	1303	13914
A9 at Raigmore	35512	2381	37892
A9 south of Aviemore	7288	1042	8331
A95 at Dulnain Bridge	3676	596	4272
A938 at Dulnain Bridge	2134	144	2278

- 10.55 In the scenario if the development did not proceed, traffic growth will occur and the links within the study network will experience increased traffic flows resulting from other development pressures, tourism traffic and population flows.
- 10.56 A review of sensitive receptors has been undertaken within the study area. **Table 10.6** details the receptors and their sensitivities for use within the following assessment. A justification for the sensitivity has been provided, based upon the details contained in **Table 10.2**.

Table 10.6: Receptor Sensitivity Summary

Receptor	Sensitivity	Justification
Users of the A939	Low - Medium	A class road, capable of use by HGV traffic with little or no traffic calming features.
Residents and communities along the A939	Negligible	Individual or scattered dwellings with no community facilities.
Users of the A96	Low	A class trunk road able to accommodate HGV traffic flows.
Ferness Residents	Low	Rural settlement with no community or public facilities.
Nairn Residents	High	Large rural settlement with community and public services.
Dulnain Bridge Residents	Medium	Rural settlement containing some community and public facilities.
Users of the A9	Negligible	A class trunk road able to accommodate HGV traffic flows.

Implications of Climate Change

- 10.57 Chapter 13: Other Issues provides details of the climate change projections in the Scottish Highlands for the 2050s, when the operational period of the proposed development is likely to end. In summary, the projections highlight that in the 2050s, summer and winter temperatures are likely to be greater than the current baseline, with winter rainfall increasing and summer rainfall decreasing.
- 10.58 It is considered that climate change projections will not have a discernible impact on the baseline conditions for road traffic within the timescales of the proposed development. It is assumed that, at a regional level, appropriate measures will be put in place to ensure flood risk is managed and does not have long term effects on transport infrastructure.

Cairn Duhie Wind Farm Design Considerations

- 10.59 The site layout allows for the use of an onsite borrow pit to provide material for the creation of the access tracks, hardstandings and compound bases. The proposed area can provide sufficient material for the construction of the entire site; however, to ensure that a robust

assessment is undertaken, it has been assumed that the borrow pit will only provide 50% of the required stone volume.

- 10.60 Batching of concrete for use onsite is considered feasible and economic and facilities to enable this are being provided at the proposed development.

Likely Significant Effects

- 10.61 The assessment is based upon the construction effects that may occur within the study area. To assess the effects, it is necessary to determine the likely traffic generation associated with the proposed development.
- 10.62 During the assumed 15-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 concrete raw materials;
 - ALLs consisting of the wind turbine components and heavy lift crane(s); and
 - escort vehicles for ALL deliveries.
- 10.63 Except for the turbine components, most traffic would be normal construction plant and would include grading tractors, excavators, high capacity cranes, forklifts and dumper trucks. Most would arrive at the site on low loaders.
- 10.64 The turbines are delivered in component sections for transport and would be assembled at the site. The nacelle, hub, drive train, blade, tower sections are classified as AIL due to their weight and/or length, width and height when loaded.
- 10.65 The components can be delivered on a variety of transport platforms with typical examples illustrated in Appendix 10.1.
- 10.66 In addition to the turbine deliveries, one high capacity erection crane would be needed to offload some components and erect the turbines. The crane is likely to be an abnormal load mobile crane with a capacity up to 1,000 tonnes that would be escorted by boom and ballast trucks to allow full mobilisation onsite. A smaller erector / assist crane will also be present to allow the assembly of the main cranes and to ease overall erection of the turbines.
- 10.67 The resulting traffic generation profile is included in Appendix 10.1. The peak of construction occurs in Month 6 with 40 HGV movements per day (20 inbound and 20 outbound) and 66 Car / LGV movements (33 inbound trips and 33 outbound trips). These figures on average indicate approximately two HGVs arriving at site every hour at the peak period.
- 10.68 The distribution of development traffic on the network would vary depending on the types of loads being transported. The assumptions for the distribution of construction traffic during the peak months would be as follows:
- All construction traffic enters the site via the site access junction on the A939.

- Deliveries associated with the batching of concrete onsite will arrive via the A939 to the north of the site. Quarries located on the A939 and A96 would be used for the supply of material. No bulk materials for use on the proposed development will access the site from the south or via the B9007.
- Sand and aggregate for use in the onsite batching plant will be sourced from local quarries. For the purposes of the assessment, it is assumed that all material will be taken from the north. The Balance of Plant (BoP) contractor will confirm final quarry and material sourcing with The Highland Council in the Construction Traffic Management Plan (CTMP).
- HGV deliveries associated with the HV electrical installation, control buildings, batteries, etc will also arrive via the A939 to the north of the site.
- Staff working at the site are likely to be based locally. It is assumed that 10% will come from communities to the east of Nairn, accessing the site via the A96 and A939. The remainder are assumed to come from Nairn and the A96 corridor (80%) or Inverness (10%).
- General site deliveries will be via the A96 and A939 to site.

10.69 Loads relating to the turbine components would be delivered on the AIL access route illustrated in Figure 10.2.

10.70 Details of the required mitigation measures are provided in the Route Survey Report appended to the Transport Assessment in Appendix 10.1.

Embedded Mitigation Measures

10.71 The following measures would be implemented during the construction phase through the CTMP. An outline of the CTMP is provided as Appendix 10.2 and the detail would be agreed with THC:

- Agree AIL route modifications and improvements with The Highland Council and other relevant stakeholders. Works will include junction widening, passing places on the B9007 and the bypass track through Ferness Field which will connect the B9007 to the A939 as illustrated in Figure 10.3.
- Where possible the detailed design process would minimise the volume of material to be imported to site to help reduce HGV numbers.
- A site worker transport and travel arrangement plan, including transport modes to and from the worksite (including pick up and drop off times).
- A Traffic Management Plan for abnormal load deliveries.
- The sheeting of all materials delivery lorries (dry materials) to reduce dust and stop spillage on public roads.
- Specific training and disciplinary measures to ensure the highest standards are maintained to prevent construction vehicles from carrying mud and debris onto the carriageway;
- Wheel cleaning facilities at the site entrance if required by THC.
- Agreement of normal site working hours, expected to be limited to between 07:00 and 19:00 (Monday to Friday) and 07:00 and 12:00 (Saturday) although component delivery and turbine erection may take place outside these hours.

- Appropriate traffic management measures on the A939 to avoid conflict with general traffic, subject to the agreement of THC. Typical measures would include HGV turning and crossing signs and/ or banksmen at the site access and warning signs.
- The provision of updates relating to traffic movements associated with vehicles accessing the site on the project website/Twitter feed and or a newsletter to be distributed to residents within an agreed distance of the site.
- Adoption of a voluntary speed limit of 20 mph for all construction vehicles through Nairn, Ferness and Dulnain Bride.
- All drivers would be required to attend an induction to include:
 - a toolbox talk safety briefing;
 - the need for appropriate care and speed control;
 - a briefing on driver speed reduction agreements (to slow site traffic at sensitive locations through the villages); and
 - identification of the required access routes and the controls to ensure no departure from these routes.

10.72 THC has requested that an agreement to cover the cost of abnormal wear on its network is made. Video footage of the pre-construction phase condition of the abnormal loads access route and the construction vehicles route would be recorded to provide a baseline of the condition of the road prior to any construction work commencing. This baseline would inform any change in the road condition during the construction phase. Any necessary repairs would be coordinated with THC's roads team. Any damage caused by traffic associated with the proposed development during the construction period that would be hazardous to public traffic would be repaired immediately.

10.73 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.

10.74 There would be a regular road review and any debris and mud would be removed from the carriageway using an onsite road sweeper to ensure road safety for all road users.

10.75 Before the AILs traverse the route, the following tasks would be undertaken to ensure load and road user safety:

- ensure any vegetation which may foul the loads is trimmed back to allow passage;
- confirm there are no roadworks or closures that could affect the passage of the loads;
- check no new or diverted underground services on the proposed route are at risk from the abnormal loads; and
- confirm the police are satisfied with the proposed movement strategy.

10.76 The access junction has been designed with consideration for all road users and will feature appropriate visibility splays, warning signage and appropriate traffic management measures for the construction period. The traffic management measures will be agreed with The Highland Council prior to construction works commencing and will be compliant with Chapter 8 of the Traffic Signs Manual.

10.77 The site access junction will feature a metalled road surface of 15m from the road edge into the site to remove the likelihood of material from migrating from the site onto the public road.

10.78 Upon completion, the junction, its associated drainage features and visibility splay will be maintained by the wind farm operator throughout the operational life of the proposed development.

Construction Effects

Predicted Construction Effects

10.79 To estimate the total trips through the Study Area during the peak of the construction phase, traffic was distributed through the network and combined with the 2023 Baseline traffic data. The resulting figures were compared with the weekday 2023 Baseline traffic to provide a percentage change in movements.

10.80 Table 10.7 summarises the traffic volumes at the peak of construction activity.

Table 10.7: 2023 Future Baseline + Construction Traffic

Survey Location	Cars & Lights	HGV	Total	% Increase in Car & LGV	% Increase in HGV	% Increase in Total Traffic
A939 Site Access	438	76	514	17.64	115.02	26.04
A939 North of Ferness	665	129	794	10.46	40.17	14.40
A939 South of Nairn	981	97	1078	6.86	61.64	10.22
A96 East of Nairn	10967	669	11636	0.06	0.00	0.05
A96 West of Nairn	12667	1340	14008	0.45	2.84	0.68
A9 at Raigmore	35528	2393	37920	0.05	0.50	0.07
A9 south of Aviemore	7291	1045	8337	0.04	0.29	0.07
A95 at Dulnain Bridge	3679	599	4278	0.08	0.50	0.14
A938 at Dulnain Bridge	2137	147	2284	0.14	2.09	0.26

10.81 With reference to the IEMA Guidelines, total traffic movements are not predicted to increase by more than 30% on all roads within the study area in either scenario.

10.82 HGV traffic flows exceed the 30% threshold at the site access junction and on the A939 between the site access junction and Nairn. Nairn is classified as having High sensitivity, whilst the A939 is classed as having Low - Medium sensitivity.

10.83 A review of existing road capacity has been undertaken using the Design Manual for Roads and Bridges, Volume 15, Part 5 "The NESAs Manual". The theoretical road capacity has been estimated for each of the road links for a 12-hour period. The assessment presented in Appendix 10.1: Transport Assessment indicates that none of the study area road links are over or at capacity.

10.84 The significance of the potential effects on receptors has been determined using the rules and thresholds discussed previously. Table 10.8 summarises the likely significant effects on the two receptors of relevance for the construction phase (in relation to HGV traffic flows).

Table 10.8: Likely Significance of Construction Phase Effects

Receptors	Severance	Driver Delay	Pedestrian Delay	Amenity	Fear	Accidents & Safety
Users of the A939 (M)	Minor	Minor	Minor	Moderate/Minor	Minor	Minor
Nairn Residents (H)	Minor	Minor	Minor	Minor	Minor	Minor

10.85 Moderate/minor effects can be judged using professional judgement. The impact on amenity on the A939 is not considered to be significant as the number of communities that the route passes through are generally widespread in nature and lack a defined community focal point.

10.86 The assessment of significance suggests construction traffic flows are not considered likely to lead to significant effects, taking account of the embedded mitigation measures outlined above.

10.87 It is important to note that whilst the increase in HGV numbers is statistically high, in relative traffic number terms, the number of additional vehicles is low. It is also worth noting that the impacts relate solely to the peak of construction activities and that the construction period is short lived and the effects transitory in nature.

10.88 The traffic flows associated with the AIL deliveries in Ferness are low and fall below the thresholds for a detailed assessment. The traffic flows associated with the deliveries will be three HGV and four car / LGV inbound trips per day during the four-month delivery period. The resulting traffic flows will not have a significant effect on assessment criteria such as amenity. No long term or residual transport effect will occur as a result of AIL deliveries made on the proposed access route.

Proposed Mitigation

10.89 No further mitigation is considered necessary beyond the embedded mitigation measures described previously.

Residual Construction Effects

10.90 Residual effects will be minor or negligible and therefore not significant.

Cumulative Effects

10.91 Cumulative operational effects have been scoped out of the assessment. At the time of assessment, there are no other wind farm developments that require consideration with respect to potential cumulative construction effects.

10.92 THC noted a number of developments that should be considered in the cumulative assessment. Of these, only the Kingsteps Housing Development in Nairn (17/05667/FUL) is considered to be relevant due to its size and location. Unfortunately, no traffic flow details for the development are available on The Highland Council Planning Portal.

10.93 The development is for a 115 unit residential development accessing onto the A96 via Lochloy Road at a junction to the west of the A96 / A939 junction in Nairn. Given the residential nature of the site and its location, it is unlikely that trips associated with the development will lead to a significant increase in traffic on the A939. The majority of trips will increase traffic flow on the A96.

10.94 The increase in traffic flow on the A96 will reduce the percentage impact that the construction phase has on the trunk road. It is therefore considered more robust to exclude these committed flows from the network, to ensure that the worst-case flows can be reported in this assessment.

10.95 The link capacity review reported in Appendix 10.1 indicates that none of the road links in the study area are subject to any capacity constraints and as such, it is considered that this approach is robust.

Predicted Cumulative Construction Effects

10.96 There are no significant cumulative construction effects.

Proposed Mitigation

10.97 No cumulative construction effect mitigation is proposed or required.

Residual Cumulative Construction Effects

10.98 There are no residual cumulative construction effects.

Interrelationship between Effects

10.99 The IEMA guidelines also refer to visual effects, noise and hazardous loads. Visual effects and noise are addressed in Chapter 5: Landscape and Visual Impact Assessment and Chapter 11: Noise respectively. No hazardous loads are associated with the proposed development therefore this effect has not been assessed.

Summary

10.100 On the basis of the findings of this assessment, the effects of increased traffic as a result of the construction of the proposed development are not deemed to be significant given that they represent a temporary change which can be accommodated by the existing road network within the Study Area. This assumes implementation of the embedded mitigation measures outlined above, including the CTMP, intended to minimise effects and related disruption to the local area, and also the appropriate design of the site access junction.

Table 10.9: Summary of Effects

Likely Effect	Mitigation	Means of Implementation	Residual Effect
Severance	Traffic management signage and voluntary 20mph limit in villages.	Implementation of CTMP via planning condition.	Minor
Driver delay	Information provision via social media / website,	CTMP Proposals and improved signage.	Minor
Pedestrian delay	Voluntary 20mph speed limit in villages and information of traffic movements	CTMP Proposals and improved signage scheme.	Minor
Pedestrian amenity	Voluntary 20mph speed limit in villages and information of traffic movements	CTMP Proposals and improved signage scheme.	Minor
Fear and intimidation	Use of temporary traffic management signage and voluntary 20mpg speed limit.	CTMP Proposals and improved signage scheme.	Minor
Accidents and safety	Improved signage, provision of an Abnormal Load Transport Management Plan, wheel washing facilities and provision of a voluntary 20mph speed limit. Section 96 agreement and junction design to THC standards.	CTMP Proposals, improved signage and develop signage strategy and agree works with THC. Construction of THC compliant access junction.	Minor

Chapter 11: Noise

11. Noise

Introduction

- 11.1 This chapter contains an assessment of the noise impact of the proposed Cairn Duhie Wind Farm (hereafter referred to as the proposed development). The assessment considers operational noise and construction noise at the nearest residential properties.
- 11.2 The chapter is supported by Figure 11.1: Predicted Noise Footprint due to Proposed Wind Farm, as well as the following appendices which are referenced in the text where relevant:
- Appendix 11.1 - Assessment of Battery Storage Compound;
 - Appendix 11.2 - Scope of Assessment;
 - Appendix 11.3 - Calculating Standardised Wind Speed;
 - Appendix 11.4 - Propagation Height & Valley Effect;
 - Appendix 11.5 - Background Noise Survey Photos;
 - Appendix 11.6 - Instrumentation Records;
 - Appendix 11.7 - Charts;
 - Appendix 11.8 - Suggested Planning Conditions; and
 - Appendix 11.9 - Glossary.

Statement of Expertise

- 11.3 This assessment has been undertaken by RES (the Applicant), with at least one in-house Member of the Institute of Acoustics involved in its preparation. RES has undertaken acoustic impact assessments in every single one of its UK wind farm development applications since 2000. RES has also carried out noise assessments and reported to several local planning authorities on operational wind energy projects, including taking measurements on newly constructed wind farms to ensure compliance with planning conditions.
- 11.4 Additionally, RES has been project co-ordinator for several Joule¹ projects, leading European research into wind turbine noise, was involved in producing the guideline ‘The Assessment and Rating of Noise from Wind Farms’² for the DTI in 1996, acted as peer reviewer for the ‘Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise’³, and contributed to the RenewableUK work on Amplitude Modulation⁴. Publications 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;
- ‘Fundamental research in amplitude modulation - a project by RenewableUK’, Dr J Bass et al, Fourth International Meeting on Wind Turbine Noise, Rome, April 2011;
- ‘Investigation of the ‘Den Brook’ Amplitude Modulation methodology for wind turbine noise’, Dr J Bass, Acoustics Bulletin Vol 36 No 6 November/December 2011;
- ‘How does noise influence the design of a wind farm?’, Dr M Cassidy, Fifth International Conference on Wind Turbine Noise, Denver, 2013;
- ‘Propagation of Noise from Wind Farms According to the Good Practice Guide’, A Birchby, Sixth International Conference on Wind Turbine Noise, Glasgow, 2015;
- ‘Addressing the Issue of Amplitude Modulation’, Dr M Cassidy, Sixth International Conference on Wind Turbine Noise, Glasgow, 2015;
- ‘A Method for Rating Amplitude Modulation in Wind Turbine Noise’, Institute of Acoustics Noise Working Group, August 2016; and
- ‘Pre-construction Site Prediction Tool for Wind Farm AM - Do We Now Know Enough?’, A Birchby, Seventh International Conference on Wind Turbine Noise, Rotterdam, 2017.

Wind Turbine Noise

- 11.5 In the context of other sources of environmental noise, the noise levels produced by wind turbines are generally low and have greater dependence upon wind speed. The combination of these two factors implies that a degree of masking would often be provided by background noise.
- 11.6 As described by Scottish Government Planning Advice for Onshore Wind Turbines⁵:
“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”.

¹ DGXII European Commission funded projects in the field of Research and Technological Development in non-nuclear energy

² ‘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

³ ‘A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise’, Institute of Acoustics, May 2013

⁴ ‘Wind Turbine Amplitude Modulation: Research to Improve Understanding as to its Cause and Effects’, RenewableUK, 2013

⁵ ‘Onshore wind turbines’, The Scottish Government, 2013, www.scotland.gov.uk

Construction Noise

- 11.7 The sources of construction noise, which are temporary, would vary both in location and duration as the different elements of the wind farm are constructed and would arise primarily through the operation of large items of plant.
- 11.8 Noise would also arise due to the temporary increase in construction traffic near the site. This level would also depend on the particular construction phase of the proposed development.
- 11.9 Blasting is anticipated to be required to extract material from the proposed borrow pits. Vibration and air overpressure due to blasting could therefore arise at periods during construction.

Scope of Assessment

- 11.10 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 and operational phase, is therefore a material consideration in the determination of planning applications.

Operational Noise

- 11.11 The main focus of the assessment of operational noise is based on the most relevant type of noise emission for modern wind turbines: aerodynamic noise, which is broadband in nature. Mechanical noise, which can be tonal in nature, is also considered albeit less relevant to modern wind turbines. Implicitly incorporated within this assessment is the normal character of the noise associated with wind turbines (commonly referred to as ‘blade swish’) and consideration of a range of noise frequencies, including low frequencies.
- 11.12 An acoustic assessment considering the operation of the proposed Battery Storage Compound can be found in **Appendix 11.1**.
- 11.13 Low frequency content of the noise from wind farms is considered through the use of octave band specific noise emission and propagation modelling, however it is considered that specific and targeted assessment on low frequency content of noise emissions from the proposed development is not required. Further justification for scoping out low frequency noise from the acoustic assessment, as well as infrasound, sleep disturbance, vibration, amplitude modulation and wind turbine syndrome can be found in **Appendix 11.2**.
- 11.14 A summary of the findings of a comprehensive study into wind turbine noise and associated health effects can be found in **Appendix 11.2**.

Construction Noise

- 11.15 The acoustic impact assessment of construction noise from the proposed development is based on the Applicant’s experience of constructing wind farms and calculated 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.

- 11.16 An assessment of the level of vibration at nearby properties due to blasting to release material from the proposed borrow pits has been undertaken. Air overpressure due to blasting cannot be reliably predicted so is not assessed here although steps to limit any resulting impact through appropriate blast design can be adopted and these are set out in the Mitigation section.
- 11.17 Whilst noise would also arise during decommissioning of the proposed development (through turbine deconstruction and breaking of the exposed part of the concrete bases) this is not discussed separately as outlined in **Chapter 4: Development Description**. Furthermore, noise levels resulting from decommissioning are expected to be lower than those during construction due to the number and type of activities involved. The impact of decommissioning can therefore be considered in the context of the conclusions of the construction noise assessment.

Legislative Framework & Guidance

Operational Noise

- 11.18 Within Scotland, noise is defined within the planning context by ‘Planning Advice Note 1/2011: Planning and Noise’⁶ (PAN 1/2011). PAN 1/2011 provides advice on the role of the planning system in helping to prevent and limit the adverse effects of noise and states that:
“Good acoustical design and siting of turbines is essential to minimise the potential to generate noise”.
- 11.19 PAN 1/2011 refers to the use of the Department of Trade and Industry’s ‘The Assessment and Rating of Noise from Wind Farms’ (ETSU-R-97), noting that further guidance is provided in the web based planning advice on renewable technologies for onshore wind turbines⁵. In relation to noise from wind farms the web-based renewables advice states:
“The Report, ‘The Assessment and Rating of Noise from Wind Farms’ 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”.
- 11.20 It is therefore considered that the use of ETSU-R-97, as criteria for assessment of wind farm noise, fulfils the requirements of PAN 1/2011.
- 11.21 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.

⁶ ‘Planning Advice Note 1/2011: Planning and Noise’, Scottish Government policy, March 2011

- 11.22 ETSU-R-97 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.
- 11.23 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”.
- 11.24 An article published in the Institute of Acoustics Bulletin (IoA Bulletin) Vol. 34 No. 2, March/April 2009⁷, 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. Whilst this article does not represent formal legislation or guidance it was authored by a group of independent acousticians experienced in wind farm noise issues who have undertaken work on behalf of wind farm developers, local planning authorities and third parties and as such is a good indicator of best practice techniques. The assessment presented herein adopts the recommendations made within this article.
- 11.25 A Good Practice Guide (IoA GPG) to the application of ETSU-R-97 for the assessment and rating of wind turbine noise³, issued by the Institute of Acoustics in May 2013 and endorsed by the Northern Ireland Executive, along with the governments in England, Scotland and Wales, 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. The assessment presented herein adopts the recommendations of the Good Practice Guide.
- 11.26 Supplementary guidance notes were published by the Institute of Acoustics in July and September 2014, and these provide further details on specific areas of the IoA GPG⁸. The assessment presented herein adopts the recommendations made within these supplementary guidance notes.
- 11.27 ETSU-R-97 has been applied at the vast majority of wind farms currently operating in the UK and provides a robust basis for assessing the noise impact of a wind farm when used in accordance with the IoA GPG. It is the only relevant guidance referenced in Scottish planning policy for rating and assessing operational wind farm noise. Based on planning policy and guidance, as outlined above, a wind farm which can operate within noise limits derived

according to ETSU-R-97 shall be considered acceptable. This approach has been agreed with The Highland Council and Moray Council.

Construction Noise

- 11.28 In the web based Scottish Government technical advice on construction noise assessment in ‘Appendix 1: Legislative Background, Technical Standards and Codes of Practice’⁹ it is stated that:
“However, 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”.
- 11.29 Given that BS 5228-1:2009 ‘Code of practice for noise and vibration control on construction and open sites - Part 1: Noise’¹⁰ is identified as being the appropriate source of guidance on appropriate methods for minimising noise from construction activities, it is adopted herein.
- 11.30 The Control of Pollution Act 1974 provides information on the need for ensuring that the best practicable means are employed to minimise noise¹¹.
- 11.31 BS 5228-2:2009 ‘Code of practice for noise and vibration control on construction and open sites - Part 2: Vibration’¹², provides a method for predicting vibration levels which has been adopted in this assessment.
- 11.32 BS 6472-2:2008 ‘Guide to evaluation of human exposure to vibration in buildings - Part 2: Blast-induced vibration’¹³ has been used to set criteria for satisfactory magnitudes of vibration at nearby residential properties to ensure compliance with respect to human response.

Consultation

- 11.33 Details of recent consultation undertaken are outlined in Table 11.1. Further consultation was carried out in 2013 in advance of the previous submission. Details of this can be found in the environmental statement for the previously consented Cairn Duhie scheme (the consented development)¹⁴.

Table 11.1: Acoustic Assessment Consultation

Consultees	Date of Consultation	Nature and Purpose of Consultation
The Highland Council	27/03/2020	Scoping response received outlining standard assessment methodology to be used.

⁷ ‘Prediction and Assessment of Wind Turbine Noise’, Bowdler et al, Acoustics Bulletin Vol 34 No 2 March/April 2009

⁸ ‘A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise - Supplementary Guidance Notes’, Institute of Acoustics, July & September 2014

⁹ ‘Appendix 1: Legislative Background, Technical Standards and Codes of Practice’, Scottish Government, 2011, www.scotland.gov.uk

¹⁰ ‘Code of Practice for Noise and vibration control on construction and open sites - Part 1: Noise’, British Standards Institution, BS 5228-1:2009

¹¹ ‘Control of Pollution Act’, Control of Pollution Act, published by Her Majesty’s Stationary Office, 1974

¹² ‘Code of Practice for Noise and vibration control on construction and open sites - Part 2: Vibration’, British Standards Institution, BS 5228-2:2009

¹³ ‘Guide to evaluation of human exposure to vibration in buildings. Blast-induced vibration’, BS 6472-2:2008

¹⁴ Cairn Duhie Wind Farm, Environmental Statement 2013, Chapter 12 – Noise

Consultees	Date of Consultation	Nature and Purpose of Consultation
The Highland Council	01/04/2020	Email sent to EHO to confirm that background noise data measured in 2004 and 2013 is still appropriate for use.
Moray Council	27/04/2020	Scoping response received. No comments relating to noise.
The Highland Council	29/04/2020	Email from EHO confirming that background noise data measured in 2004 and 2013 is still appropriate for use.

Methodology

Operational Noise

11.34 To ensure adequate assessment of the potential impacts of the operational noise from the proposed development the following steps have been taken, in accordance with relevant guidance detailed above:

- The baseline noise conditions at each of the nearest residential properties to the wind farm are established by way of representative background noise surveys.
- The noise levels at the nearest residential properties from the operation of the proposed development are predicted using a sound propagation model considering: the locations of the wind turbines; the intervening terrain; and the likely noise emission characteristics of the wind turbines.
- With due regard to relevant guidance or regulations the acoustic assessment criteria are derived.
- The evaluation of the acoustic impact is undertaken by comparing the predicted noise levels with the assessment criteria.

Establishing Baseline Conditions

11.35 Similar to other assessments of noise impacts (most notably BS 414215, which ETSU-R-97 identifies as forming the basis of its recommendations), the ETSU-R-97 methodology requires the comparison of predicted noise levels due to turbine emissions (which vary with hub height wind speed) with noise limits based upon the noise levels already existing under those same conditions (i.e. the baseline conditions).

11.36 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 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 residential properties, since it is this wind speed that would subsequently govern the wind farm's noise

generation. Often the residential properties themselves will be sheltered from the wind and may consequently have relatively low background noise levels.

11.37 To establish the baseline conditions, sound level meters and associated apparatus are set-up to record the required acoustic information at a selection of the nearest residential properties geographically spread around the proposed development site and which are likely to be representative of other residential properties in the locale.

11.38 Wind speed and direction are recorded as 10 minute averages for the same period as for the noise measurements, and are synchronised with the acoustic data to allow correlations to be established. The wind speed that is adopted for use is the same wind speed as that which drives the turbine noise levels.

11.39 The adoption of this wind speed was recommended within the article published in the IoA Bulletin and the subsequent IoA GPG. The methodology used to calculate standardised 10m wind speed is described in **Appendix 11.3**.

11.40 Prior to establishing the baseline conditions the acoustic data is filtered as follows:

- For each background noise measurement location, the measured noise data is divided into two sets, as specified by ETSU-R-97 and shown in
- **Table 11.2:**

Table 11.2: Definition of Time of Day Periods

Time of Day	Definition
Quiet daytime	18:00 - 23:00 every day 13:00 - 18:00 Saturday 07:00 - 18:00 Sunday
Night-time	23:00 - 07:00 every day

- Rainfall affected data is systematically removed from the acoustic data set.
- Periods of measured background noise data thought to be affected by extraneous, i.e. non-typical, noise sources are identified and removed from the data set. Whilst some 'extraneous' data may actually be real, it tends to bias any trend lines upwards so its removal is adopted as a conservative measure.
- In practice this means close inspection of the measured background noise levels, comparison with concurrent data measured at nearby locations and consideration of both directional and temporal variation.

Modelling Noise Propagation

11.41 Whilst there are several sound propagation models available, the ISO 9613 Part 2 model has been used¹⁶, this being identified as most appropriate for use in such rural sites¹⁷. The specific

¹⁵ 'Method for Rating Industrial Noise affecting Mixed Residential and Industrial Areas', British Standards Institution, 1997

¹⁶ 'Acoustics - Attenuation of Sound During Propagation Outdoors, Part 2: General Method of Calculation', International Organisation for Standardisation, ISO 9613-2:1996

¹⁷ 'A Critical Appraisal of Wind Farm Noise Propagation', ETSU Report W/13/00385/REP, 2000

interpretation of the ISO 9613 Part 2 propagation methodology recommended in the aforementioned IoA Bulletin and the subsequent IoA GPG has been employed.

11.42 To make noise predictions it is assumed that:

- the turbines are identical;
- the turbines radiate noise at the power specified in this report;
- each turbine can be modelled as a point source at hub-height; and
- each residential property is assigned a reference height to simulate the presence of an observer.

11.43 The sound propagation model takes account of attenuation due to geometric spreading and atmospheric absorption. The assumed temperature and relative humidity are 10 °C and 70 % respectively, as recommended in the IoA Bulletin and IoA GPG. Ground effects are also taken into account by the propagation model with a ground factor of 0.5 and a receiver height of 4m used as recommended in the IoA Bulletin and IoA GPG.

11.44 The barrier attenuations predicted by ISO 9613 Part 2 have been shown to be significantly greater than those measured in practice under downwind conditions¹⁷. 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 residential property in question and any part of the wind turbine, 2dB attenuation has been assumed as recommended in the IoA Bulletin and the IoA GPG.

11.45 Additionally, verification studies have also shown that ISO 9613 Part 2 tends to slightly underestimate noise levels at nearby dwellings in certain exceptional cases, notably in a valley type environment where the ground drops off between source and receiver. In these instances an addition of 3dB(A) has been applied to the resulting overall A-weighted noise level as recommended by the IoA GPG. Further detail is provided in Appendix 11.4.

11.46 To generate the ground cross sections between each turbine and each dwelling necessary for reliable propagation modelling, ground contours at 5m intervals for the area of interest have been generated from 50m grid resolution digital terrain data.

11.47 The predicted noise levels are calculated as LAeq noise levels and changed to the LA90 descriptor (to allow comparisons to be made) by subtraction of -2dB, as specified by ETSU-R-97.

11.48 It has been shown by measurement-based verification studies that the ISO 9613 Part 2 model tends to slightly overestimate noise levels at nearby dwellings¹⁷. Examples of additional conservative assumptions modelled are:

- Properties are assumed to be downwind of all noise sources simultaneously and at all times. In reality, this is not the case and additional attenuation would be expected when a property is upwind or 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 IoA Bulletin and IoA GPG.
- Receiver heights are modelled at 4m above local ground level, which equates roughly to first floor window level, as recommended by the IoA Bulletin and IoA GPG. This results in a predicted noise level anything up to 2dB(A) higher than at the typical human ear height of 1.2-1.8m.
- Trees and other non-terrain shielding effects have not been considered.
- An allowance for measurement uncertainty has been included in the sound power levels for the presented turbine.

Operational Noise Impact Criteria

11.49 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.

11.50 ETSU-R-97 seeks to protect the internal and external amenity of wind farm neighbours by defining acceptable limits for operational noise from wind turbines. The test applied to operational noise is whether or not the noise levels produced by the combined operation of the wind turbines lie below noise limits derived in accordance with ETSU-R-97 at nearby residential properties.

Whilst ETSU-R-97 presents a comprehensive and detailed assessment methodology for wind farm noise, it also provides a simplified methodology:

“if the noise is limited to an LA90,10min of 35dB(A) up to wind speeds of 10m/s at 10m height, then these conditions alone would offer sufficient protection of amenity, and background noise surveys would be unnecessary”.

11.51 In the detailed methodology, ETSU-R-97 states that different limits should be applied during daytime and night-time periods. The daytime limits, derived from the background noise levels measured during quiet daytime periods, 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 in

Table 11.3 below, where L_B is the background $LA_{90,10min}$ and is a function of wind speed. During daytime periods and at low background noise levels, a lower fixed limit of 35-40dB(A) is applicable. 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 11.3: Permissible Noise Level Criteria

Time of Day	Permissible Noise Level
Daytime	<ul style="list-style-type: none"> • 35-40dB(A) for L_B less than 30-35dB(A) • $L_B + 5dB$, for L_B greater than 30-35dB(A)
Night-time	<ul style="list-style-type: none"> • 43dB(A) for L_B less than 38dB(A) • $L_B + 5dB$, for L_B greater than 38dB(A)

11.52 Note that a higher noise level is permissible during the night than during the day as it is assumed that residents would be indoors. The night-time criterion is derived from sleep disturbance criterion referred to in ETSU-R-97, with an allowance of 10dB for attenuation through an open window.

11.53 The wind speeds at which the acoustic impact is considered are less than or equal to 12ms-1 at a height of 10m 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 the wind speeds presented, it is most unlikely that it would cause any greater loss of amenity at higher wind speeds due to increasing background noise levels masking wind farm generated noise.

11.54 It is important to note that, since reactions to noise are subjective, it is not possible to guarantee that a given development would not result in any adverse comment with regard to noise as the response to any given noise will vary from person to person. Consequently, standards and guidance that relate to environmental noise are typically presented in terms of criteria that would be expected to be considered acceptable by the majority of the population.

Construction Noise

11.55 To ensure adequate assessment of the potential impacts of the construction noise from the proposed development the following steps have been taken:

- baseline noise criteria are established from the appropriate guidance BS 5228-1:2009;
- noise levels due to onsite construction activities are predicted at nearby residential properties in accordance with the BS 5228-1:2009 standard;
- predicted noise levels due to construction traffic at the same residential properties are made using the BS 5228-1:2009 standard;
- the combined effect of onsite construction activities with construction traffic is compared with the target level specified by BS 5228-1:2009; and
- predictions of the level of vibration due to blasting are made using BS 5228-2:2009 and the significance evaluated using BS 6472-2:2008.

Baseline Conditions

Operational Noise

- 11.56 The proposed development is located approximately 15km south-east of Nairn. The surrounding area is predominantly rural in nature and used for grazing sheep and cattle with A-class roads running to the east and west of the site. The general noise character is typical of a rural environment with noise from farm machinery, sheep, cattle, and birds, with the occasional overhead aircraft. There is also some traffic noise from the A-class roads near the site.
- 11.57 Background noise measurements were undertaken at six residential property locations in accordance with ETSU-R-97 as detailed in **Table 11.4**. Measurements were carried out at three locations in 2004 and at a further three locations in 2013.

Table 11.4 - Background Noise Survey Details

House Name	Measurement Period		
	Start	End	Duration (days)
Kerrow Farmhouse	03/06/2004	29/06/2004	27
Little Aitnoch	03/06/2004	29/06/2004	27
Muckle Lyne	03/06/2004	29/06/2004	27
Achnabechan Farm	17/05/2013	23/07/2013	68
Braemoray Lodge	21/06/2013	01/08/2013	42
The Old Schoolhouse	17/05/2013	01/08/2013	77

- 11.58 The background noise monitoring equipment was housed in weather-proof enclosures and powered by lead-acid batteries. The microphones were placed at a height of approximately 1.2m - 1.5m above ground and equipped with all-weather wind shields which also provide an element of water resistance.
- 11.59 The proprietary wind shields used are designed to reduce the effects of wind-generated noise at the microphone and accord with the recommendations of the IoA GPG in that they are the appropriate size and, in combination with the microphone, are certified by the manufacturer as meeting Type 1 / Class 1 precision standards.
- 11.60 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).

- 11.61 The sound level meters were placed away from reflecting walls and vegetation. Photos of the equipment, in situ, may be seen in **Appendix 11.5**. 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, as recommended in the IoA GPG. Details are provided in **Appendix 11.6**.
- 11.62 **Chart 11.1** (see **Appendix 11.7** for all charts) shows the measured wind rose over the 2004 background noise survey period, as measured by the meteorological mast located onsite. **Chart 11.2** shows the measured wind rose over the 2013 background noise survey period, as measured by the LIDAR located onsite.
- 11.63 LIDAR (Light Detection and Ranging) 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 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.
- 11.64 LIDAR has been successfully tested, by independent third parties using suitable test sites, against conventional anemometry^{18,19}. 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.
- 11.65 For illustrative purposes, **Chart 11.3** shows the measured wind rose over an extended period (16/08/2002 - 13/02/2007) from the meteorological mast located on the proposed development site. As previously discussed, the noise prediction model employed is likely to overestimate the real noise immission levels for locations not downwind of the turbines. **Chart 11.3** therefore may aid the reader as to the likelihood of over-estimation due to this factor.
- 11.66 Noise data from the 2004 survey has been cross-referenced with rainfall data measured at Kinloss meteorological station located 24km north of site. Data from a rain gauge located at the LIDAR was available for the 2013 survey. Any noise data identified as having been affected by rainfall has been removed from the analysis as shown in **Charts 11.4 to 11.15**.
- 11.67 Both the 10 minute period containing the bucket tip and the preceding 10 minute period are removed from the 2013 dataset as recommended in the IoA GPG to account for the time it takes for the rain gauge tipping bucket to fill. The rain data concurrent with the 2004 survey is at an hourly resolution. The preceding 10 minute period has not been systematically removed from the 2004 dataset but any elevated noise levels in this period have been removed if considered atypical.
- 11.68 Short-term periods of increased noise levels considered to be atypical have been removed from the dataset. The excluded data is shown in **Charts 11.4 to 11.15**.

¹⁸ "Evaluation of WINDCUBE", Albers et al, Deutsche WindGuard Consulting GmbH, Report PP 08007, 16 March 2008

¹⁹ "Verification test for three WindCube™ WLS7 LiDARs at the Høvsøre test site", Gottschall et al, DTU Report Risø-R-1732, May 2010

- 11.69 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.
- 11.70 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.
- 11.71 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.
- 11.72 **Charts 11.4 to 11.9** show $L_{A90,10min}$ correlated against wind speed for quiet daytime periods at each survey location. In each case, a 'best fit' line has been fitted to the data and the noise limits added. The equation of the regression polynomial has been provided in the charts.
- 11.73 **Charts 11.10 to 11.15** show $L_{A90,10min}$ 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 noise limits added. The equation of the regression polynomial has been provided in the charts.
- 11.74 **Table 11.5** and **Table 11.6** detail the $L_{A90,10min}$ background noise levels calculated from the derived 'best fit' lines, as described above. No significant differences between the results from the two survey periods were observed and there have been no changes in the area since 2013 that are expected to have altered the noise environment significantly.

Table 11.5 - Quiet Daytime Noise Levels (dB(A) re 20 µPa)

House Name	Standardised 10m Wind Speed (ms ⁻¹)											
	1	2	3	4	5	6	7	8	9	10	11	12
Achnabechan Farm	23.3	24.1	25.1	26.2	27.5	29.1	31.0	33.4	36.1	39.4	39.4	39.4
Braemoray Lodge	25.4	26.0	27.5	29.6	32.3	35.3	38.6	42.0	45.4	48.6	48.6	48.6
Kerrow Farmhouse	31.5	31.5	31.8	32.6	33.8	35.3	36.9	38.6	40.2	41.6	42.7	42.7
Little Aitnoch	22.3	22.3	23.2	24.9	27.4	30.2	33.0	35.7	37.9	39.4	39.8	39.8
Muckle Lyne	27.3	27.3	27.7	28.5	29.8	31.3	33.2	35.2	37.4	39.6	41.8	41.8
The Old Schoolhouse	25.0	26.2	27.7	29.6	31.8	34.1	36.5	39.1	41.6	44.2	44.2	44.2

Table 11.6 - Night-time Noise Levels (dB(A) re 20 µPa)

House Name	Standardised 10m Wind Speed (ms ⁻¹)											
	1	2	3	4	5	6	7	8	9	10	11	12
Achnabechan Farm	20.9	21.3	21.8	22.6	23.5	24.8	26.3	28.3	30.6	33.5	36.8	36.8
Braemoray Lodge	26.0	26.0	26.6	27.9	29.7	32.0	34.5	37.1	39.5	41.7	43.5	43.5
Kerrow Farmhouse	28.4	29.1	29.8	30.5	31.3	32.1	33.1	34.2	35.5	37.2	37.2	37.2
Little Aitnoch	21.9	21.9	22.4	23.5	25.3	27.7	30.6	34.0	37.9	42.2	42.2	42.2
Muckle Lyne	24.5	24.5	24.7	25.5	26.8	28.4	30.3	32.2	34.0	35.5	35.5	35.5
The Old Schoolhouse	23.8	23.8	24.4	25.9	27.9	30.3	32.7	34.8	36.3	36.8	36.8	36.8

Construction Noise

- 11.75 For the onsite construction noise assessment, Annex E of BS 5228-1:2009 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 development is the ABC method. The ABC method sets threshold noise levels for specific periods based on the ambient noise levels.

Potential Impacts

Potential Operational Impacts

Noise Propagation Modelling

- 11.76 The locations of the proposed turbines are provided in **Table 11.7** and shown in **Figure 11.1**.

Table 11.7: Location of Proposed Turbines

Turbine	Co-ordinates	
	X (m)	Y (m)
T1	298244	841792
T2	297604	841838
T3	298008	842020
T4	297732	842256
T5	298401	842340
T6	298088	842499
T7	297299	842524
T8	298010	842823

Turbine	Co-ordinates	
	X (m)	Y (m)
T9	298488	842869
T10	297523	842967
T11	297214	843227
T12	298150	843227
T13	297529	843524
T14	297932	843548
T15	297488	843895
T16	297988	843938

11.77 The locations of the nearest residential properties to the turbines have been determined by inspection of relevant maps and through site visits. More residential properties may have been identified but have not been considered critical to this acoustic assessment or may be adequately represented by another residential property. The locations considered are listed in **Table 11.8** and are also shown in **Figure 11.1**.

11.78 The distances from each residential property to the nearest turbine are given in **Table 11.8**. It can be seen that the minimum house-to-turbine separation is 1245m.

Table 11.8: Location of Residential Properties and Distances to Nearest Proposed Turbine

House Name	House ID	Co-ordinates		Distance (m)	Nearest Turbine
		X (m)	Y (m)		
DAVA SCHOOLHOUSE	H4	300397	838510	3925	T1
BRAEMORAY	H5	300722	839078	3675	T1
AITNOCH FARMHOUSE	H6	298159	839665	2129	T1
REFOUBLE	H7	295180	839998	3043	T2
LITTLE AITNOCH	H8	296892	840817	1245	T2
DRUMLOCHAN	H9	294308	841097	3314	T7
MILLTOWN	H10	294501	841256	3072	T7
KERROW FARMHOUSE	H11	299626	841900	1302	T5
KENNELS	H12	294198	842449	3102	T7
BRAEMORAY LODGE	H13	299789	842836	1301	T9
THE LODGE	H14	295166	843046	2056	T11
THE WHITE HOUSE	H15	300059	843252	1617	T9
Unknown 1	H16	295442	843576	1806	T11

House Name	House ID	Co-ordinates		Distance (m)	Nearest Turbine
		X (m)	Y (m)		
1 DRUMORE COTTAGES	H17	295442	843576	1806	T11
Unknown 2	H18	295442	843576	1806	T11
ACHNABECHAN FARM	H19	295788	843733	1513	T11
CULFEARN	H20	300008	843810	1788	T9
FORESTERS COTTAGE	H21	295658	843889	1691	T11
TOMBAIN	H22	300613	844376	2605	T9
FACTORS COTTAGE	H23	295765	844470	1816	T15
TOMNARROCH	H24	296158	844553	1484	T15
TOMDOW	H25	300493	844646	2603	T16
TOMDOW COTTAGE	H26	300526	844681	2645	T16
LEONACH COTTAGE	H27	296232	844818	1559	T15
Unknown 3	H28	296241	844835	1562	T15
BIRCH COTTAGE	H29	296250	844856	1567	T15
Unknown 4	H30	296261	844881	1574	T15
SMIDDY HOUSE	H31	296261	844907	1590	T15
ROSE COTTAGE	H32	296273	844916	1587	T15
THE OLD POST OFFICE HOUSE	H33	296282	844939	1595	T15
BUNGALOW	H34	296312	844991	1608	T15
Unknown 5	H35	296376	845080	1625	T15
MUCKLE LYNE	H36	297924	845290	1354	T16
LITTLE LYNE	H37	297391	845305	1413	T15
HEAD FORESTERS HOUSE	H38	296356	845373	1862	T15
1 FORESTRY HOUSES	H39	296453	845632	2022	T15
2 FORESTRY HOUSES	H40	296459	845641	2027	T15
3 FORESTRY HOUSES	H41	296467	845652	2032	T15
Unknown 6	H42	296496	845656	2021	T15
4 FORESTRY HOUSES	H43	296473	845661	2037	T15
5-6 FORESTRY HOUSES	H44	296488	845662	2030	T15

House Name	House ID	Co-ordinates		Distance (m)	Nearest Turbine
		X (m)	Y (m)		
GLENERNIE HOUSE	H45	300862	845682	3362	T16
WESTER TILLIEGLENS	H46	300432	846100	3263	T16
BALLENRIECH	H47	300449	846667	3675	T16
TILLIEGLENS	H48	300307	847388	4157	T16
RELUGAS 1	H49	300008	847584	4168	T16
RELUGAS 2	H50	299931	847611	4155	T16
AUCHNAGAIRN	H51	298748	847882	4017	T16
TILLIDIVIE HOUSE	H52	299513	847940	4283	T16
MILLS OF AIRDRIE	H53	297564	845883	1989	T15
SCORE	H54	297275	845877	1993	T15
THE MOUNT	H55	297902	845725	1789	T16
THE OLD SCHOOLHOUSE	H56	296296	844955	1595	T15

11.79 Although not finalised, the candidate turbine type for the proposed development is the Vestas V117-4.2MW turbine. This report uses the acoustic data from the manufacturer's general specification for this machine for all analysis²⁰. The manufacturer has identified these values as warranted although no independent test reports are available to indicate whether any margin has been incorporated, therefore 2dB has been added to the warranted levels as a conservative measure as recommended by the IoA GPG. Details used in this analysis are as follows:

- a hub height of 91.4m;
- a rotor diameter of 117.0m;
- sound power levels, LWA, for standardised 10m height wind speeds (v_{10}) as shown in Table 11.9;
- octave band sound power level data, at the wind speeds where it is available, as shown in Table 11.10;
- tonal emission characteristics such that no clearly audible tones are present at any wind speed.

Table 11.9: A-Weighted Sound Power Levels (dB(A) re 1 pW) for the Vestas V117-4.2MW Wind Turbine

Standardised 10m Height Wind Speed, v_{10} (ms^{-1})	Warranted	Plus Uncertainty
1	93.1	95.1

Standardised 10m Height Wind Speed, v_{10} (ms^{-1})	Warranted	Plus Uncertainty
2	93.1	95.1
3	93.1	95.1
4	96.0	98.0
5	100.2	102.2
6	104.0	106.0
7	105.9	107.9
8	106.0	108.0
9	106.0	108.0
10	106.0	108.0
11	106.0	108.0
12	106.0	108.0

Table 11.10 - Octave Band A-Weighted Sound Power Levels (dB(A) re 1 pW) at Standardised 10m Height Wind Speeds for the Vestas V117-4.2MW Wind Turbine

Octave Band (Hz)	8ms^{-1}
63	88.3
125	95.5
250	100.3
500	102.6
1000	102.4
2000	99.7
4000	94.6
8000	87.0
OVERALL	108.0

Predictions of Noise Levels at Residential Properties

11.80 Table 11.11 shows the predicted noise immission levels at the nearest residential properties at each wind speed considered, calculated from the operation of the proposed development. The property with the highest predicted noise immission level of 38.1dB(A) is H11.

11.81 Figure 11.1 shows an isobel (i.e. noise contour) plot for the site at a 10m height wind speed of 8ms^{-1} . Such plots are useful for evaluating the noise 'footprint' of a given development.

²⁰ 'Performance Specification V117 – 4.0/4.2 MW 50/60 Hz Strong Wind', Vestas, Document ID: 0067 7063 V05, 2018-09-10

Table 11.11: Predicted Noise Levels At Nearby Residential Properties, dB(A)

House ID	Reference Wind Speed, Standardised v_{10} (ms^{-1})											
	1	2	3	4	5	6	7	8	9	10	11	12
H4	13.5	13.5	13.5	16.4	20.6	24.4	26.3	26.4	26.4	26.4	26.4	26.4
H5	14.5	14.5	14.5	17.4	21.6	25.4	27.3	27.4	27.4	27.4	27.4	27.4
H6	19.6	19.6	19.6	22.5	26.7	30.5	32.4	32.5	32.5	32.5	32.5	32.5
H7	16.3	16.3	16.3	19.2	23.4	27.2	29.1	29.2	29.2	29.2	29.2	29.2
H8	24.3	24.3	24.3	27.2	31.4	35.2	37.1	37.2	37.2	37.2	37.2	37.2
H9	16.0	16.0	16.0	18.9	23.1	26.9	28.8	28.9	28.9	28.9	28.9	28.9
H10	16.7	16.7	16.7	19.6	23.8	27.6	29.5	29.6	29.6	29.6	29.6	29.6
H11	25.2	25.2	25.2	28.1	32.3	36.1	38.0	38.1	38.1	38.1	38.1	38.1
H12	17.0	17.0	17.0	19.9	24.1	27.9	29.8	29.9	29.9	29.9	29.9	29.9
H13	24.9	24.9	24.9	27.8	32.0	35.8	37.7	37.8	37.8	37.8	37.8	37.8
H14	20.7	20.7	20.7	23.6	27.8	31.6	33.5	33.6	33.6	33.6	33.6	33.6
H15	25.0	25.0	25.0	27.9	32.1	35.9	37.8	37.9	37.9	37.9	37.9	37.9
H16	21.8	21.8	21.8	24.7	28.9	32.7	34.6	34.7	34.7	34.7	34.7	34.7
H17	21.8	21.8	21.8	24.7	28.9	32.7	34.6	34.7	34.7	34.7	34.7	34.7
H18	21.8	21.8	21.8	24.7	28.9	32.7	34.6	34.7	34.7	34.7	34.7	34.7
H19	23.4	23.4	23.4	26.3	30.5	34.3	36.2	36.3	36.3	36.3	36.3	36.3
H20	22.9	22.9	22.9	25.8	30.0	33.8	35.7	35.8	35.8	35.8	35.8	35.8
H21	22.4	22.4	22.4	25.3	29.5	33.3	35.2	35.3	35.3	35.3	35.3	35.3
H22	20.3	20.3	20.3	23.2	27.4	31.2	33.1	33.2	33.2	33.2	33.2	33.2
H23	21.6	21.6	21.6	24.5	28.7	32.5	34.4	34.5	34.5	34.5	34.5	34.5
H24	23.2	23.2	23.2	26.1	30.3	34.1	36.0	36.1	36.1	36.1	36.1	36.1
H25	19.4	19.4	19.4	22.3	26.5	30.3	32.2	32.3	32.3	32.3	32.3	32.3
H26	19.2	19.2	19.2	22.1	26.3	30.1	32.0	32.1	32.1	32.1	32.1	32.1
H27	22.2	22.2	22.2	25.1	29.3	33.1	35.0	35.1	35.1	35.1	35.1	35.1
H28	22.2	22.2	22.2	25.1	29.3	33.1	35.0	35.1	35.1	35.1	35.1	35.1
H29	22.0	22.0	22.0	24.9	29.1	32.9	34.8	34.9	34.9	34.9	34.9	34.9
H30	21.8	21.8	21.8	24.7	28.9	32.7	34.6	34.7	34.7	34.7	34.7	34.7
H31	21.5	21.5	21.5	24.4	28.6	32.4	34.3	34.4	34.4	34.4	34.4	34.4
H32	21.5	21.5	21.5	24.4	28.6	32.4	34.3	34.4	34.4	34.4	34.4	34.4
H33	21.5	21.5	21.5	24.4	28.6	32.4	34.3	34.4	34.4	34.4	34.4	34.4
H34	21.2	21.2	21.2	24.1	28.3	32.1	34.0	34.1	34.1	34.1	34.1	34.1
H35	20.9	20.9	20.9	23.8	28.0	31.8	33.7	33.8	33.8	33.8	33.8	33.8
H36	23.6	23.6	23.6	26.5	30.7	34.5	36.4	36.5	36.5	36.5	36.5	36.5
H37	23.3	23.3	23.3	26.2	30.4	34.2	36.1	36.2	36.2	36.2	36.2	36.2
H38	19.6	19.6	19.6	22.5	26.7	30.5	32.4	32.5	32.5	32.5	32.5	32.5
H39	19.3	19.3	19.3	22.2	26.4	30.2	32.1	32.2	32.2	32.2	32.2	32.2

House ID	Reference Wind Speed, Standardised v_{10} (ms^{-1})											
	1	2	3	4	5	6	7	8	9	10	11	12
H40	19.2	19.2	19.2	22.1	26.3	30.1	32.0	32.1	32.1	32.1	32.1	32.1
H41	19.2	19.2	19.2	22.1	26.3	30.1	32.0	32.1	32.1	32.1	32.1	32.1
H42	19.2	19.2	19.2	22.1	26.3	30.1	32.0	32.1	32.1	32.1	32.1	32.1
H43	19.2	19.2	19.2	22.1	26.3	30.1	32.0	32.1	32.1	32.1	32.1	32.1
H44	19.1	19.1	19.1	22.0	26.2	30.0	31.9	32.0	32.0	32.0	32.0	32.0
H45	15.9	15.9	15.9	18.8	23.0	26.8	28.7	28.8	28.8	28.8	28.8	28.8
H46	15.5	15.5	15.5	18.4	22.6	26.4	28.3	28.4	28.4	28.4	28.4	28.4
H47	13.7	13.7	13.7	16.6	20.8	24.6	26.5	26.6	26.6	26.6	26.6	26.6
H48	12.5	12.5	12.5	15.4	19.6	23.4	25.3	25.4	25.4	25.4	25.4	25.4
H49	10.5	10.5	10.5	13.4	17.6	21.4	23.3	23.4	23.4	23.4	23.4	23.4
H50	10.6	10.6	10.6	13.5	17.7	21.5	23.4	23.5	23.5	23.5	23.5	23.5
H51	12.9	12.9	12.9	15.8	20.0	23.8	25.7	25.8	25.8	25.8	25.8	25.8
H52	11.9	11.9	11.9	14.8	19.0	22.8	24.7	24.8	24.8	24.8	24.8	24.8
H53	20.2	20.2	20.2	23.1	27.3	31.1	33.0	33.1	33.1	33.1	33.1	33.1
H54	20.1	20.1	20.1	23.0	27.2	31.0	32.9	33.0	33.0	33.0	33.0	33.0
H55	21.1	21.1	21.1	24.0	28.2	31.9	33.9	34.0	34.0	34.0	34.0	34.0
H56	21.4	21.4	21.4	24.3	28.5	32.3	34.2	34.3	34.3	34.3	34.3	34.3

11.82 Noise levels at 41 of the 53 nearest residential properties are below 35dB(A), indicating that the noise immission levels would be regarded as acceptable and the residents amenity as receiving ‘sufficient protection’ without further assessment requiring to be undertaken.

11.83 There are 12 properties that have predicted noise levels greater than this simplified noise criteria as indicated in Table 11.11. Therefore the ‘full’ acoustic assessment need only be considered at these. However, as background noise measurements were carried out at The Old Schoolhouse (H56), as agreed with the local authority, 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 development.

11.84 The maximum predicted noise level at each property due to the proposed development can be compared to that presented in the noise chapter of the environmental statement for the consented development¹⁴. This indicates that, for properties with predicted noise levels of greater than 35dB(A) in Table 11.11, the difference ranges from a reduction of 1.0dB(A) at H8 to an increase of 0.6dB(A) at H27. The maximum predicted noise level at any property has reduced by 0.1dB(A).

Acoustic Acceptance Criteria

11.85 As stated previously, during daytime periods and at low background noise levels, a lower fixed limit of 35-40dB(A) is applicable with the exact value dependent upon a number of factors:

the number of noise affected residential properties; the potential impact on the power output of the wind farm and the likely duration and level of exposure.

- 11.86 Whilst a daytime lower limit of greater than 35dB(A) would potentially be justifiable, a daytime lower limit of 35dB(A) has been adopted for the assessment of the proposed development as a conservative measure in accordance with The Highland Council guidance. A 38dB(A) night-time lower limit has also been adopted in accordance with The Highland Council guidance despite not being in agreement with ETSU-R-97. The resulting criteria are shown in **Table 11.12**.

Table 11.12: Permissible Noise Level Criteria in Vicinity of Proposed Development

Time of Day	Permissible Noise Level
Daytime	<ul style="list-style-type: none"> 35.0dB(A) for L_B less than 30.0dB(A) $L_B + 5 B$, for L_B greater than 30.0dB(A)
Night-time	<ul style="list-style-type: none"> 38.0dB(A) for L_B less than 33.0dB(A) $L_B + 5dB$, for L_B greater than 33.0dB(A)

Calculation of Acceptable Noise Limits from Baseline Conditions

- 11.87 The 'best-fit' lines of **Charts 11.4 to 11.15** have been used to calculate the acceptable noise limits at the background noise measurement locations. **Table 11.13** shows the daytime noise limits and **Table 11.14** the night-time noise limits.

Table 11.13 - Recommended Daytime Noise Limits (dB(A) re 20 μ Pa)

House Name	Standardised 10m Wind Speed (ms^{-1})											
	1	2	3	4	5	6	7	8	9	10	11	12
Achnabechan Farm	35.0	35.0	35.0	35.0	35.0	35.0	36.0	38.4	41.1	44.4	44.4	44.4
Braemoray Lodge	35.0	35.0	35.0	35.0	37.3	40.3	43.6	47.0	50.4	53.6	53.6	53.6
Kerrow Farmhouse	36.5	36.5	36.8	37.6	38.8	40.3	41.9	43.6	45.2	46.6	47.7	47.7
Little Aitnoch	35.0	35.0	35.0	35.0	35.0	35.2	38.0	40.7	42.9	44.4	44.8	44.8
Muckle Lyne	35.0	35.0	35.0	35.0	35.0	36.3	38.2	40.2	42.4	44.6	46.8	46.8
The Old Schoolhouse	35.0	35.0	35.0	35.0	36.8	39.1	41.5	44.1	46.6	49.2	49.2	49.2

Table 11.14 - Recommended Night-time Noise Limits (dB(A) re 20 μ Pa)

House Name	Standardised 10m Wind Speed (ms^{-1})											
	1	2	3	4	5	6	7	8	9	10	11	12
Achnabechan Farm	38.0	38.0	38.0	38.0	38.0	38.0	38.0	38.0	38.0	38.5	41.8	41.8
Braemoray Lodge	38.0	38.0	38.0	38.0	38.0	38.0	39.5	42.1	44.5	46.7	48.5	48.5
Kerrow Farmhouse	38.0	38.0	38.0	38.0	38.0	38.0	38.1	39.2	40.5	42.2	42.2	42.2
Little Aitnoch	38.0	38.0	38.0	38.0	38.0	38.0	38.0	39.0	42.9	47.2	47.2	47.2
Muckle Lyne	38.0	38.0	38.0	38.0	38.0	38.0	38.0	38.0	39.0	40.5	40.5	40.5
The Old Schoolhouse	38.0	38.0	38.0	38.0	38.0	38.0	38.0	39.8	41.3	41.8	41.8	41.8

- 11.88 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 11.15**. The specific choice of noise survey chosen has been made considering the distance to the nearest survey location and the likelihood of experiencing a broadly similar exposure as the survey. Although some properties to the east are more proximate to Braemoray Lodge, Kerrow Farmhouse is seen as a more representative location.

Table 11.15 - Assumed Representative Background Noise Survey Locations

House Name	House ID	Survey Location
DAVA SCHOOLHOUSE	H4	Kerrow Farmhouse
BRAEMORAY	H5	Kerrow Farmhouse
AITNOCH FARMHOUSE	H6	Little Aitnoch
REFOUBLE	H7	Little Aitnoch
LITTLE AITNOCH	H8	Little Aitnoch
DRUMLOCHAN	H9	Little Aitnoch
MILLTOWN	H10	Little Aitnoch
KERROW FARMHOUSE	H11	Kerrow Farmhouse
KENNELS	H12	Achnabechan Farm
BRAEMORAY LODGE	H13	Braemoray Lodge

House Name	House ID	Survey Location
THE LODGE	H14	Achnabechan Farm
THE WHITE HOUSE	H15	Kerrow Farmhouse
Unknown 1	H16	Achnabechan Farm
1 DRUMORE COTTAGES	H17	Achnabechan Farm
Unknown 2	H18	Achnabechan Farm
ACHNABECHAN FARM	H19	Achnabechan Farm
CULFEARN	H20	Kerrow Farmhouse
FORESTERS COTTAGE	H21	Achnabechan Farm
TOMBAIN	H22	Kerrow Farmhouse
FACTORS COTTAGE	H23	The Old Schoolhouse
TOMNARROCH	H24	The Old Schoolhouse
TOMDOW	H25	Kerrow Farmhouse
TOMDOW COTTAGE	H26	Kerrow Farmhouse
LEONACH COTTAGE	H27	The Old Schoolhouse
Unknown 3	H28	The Old Schoolhouse
BIRCH COTTAGE	H29	The Old Schoolhouse
Unknown 4	H30	The Old Schoolhouse
SMIDDY HOUSE	H31	The Old Schoolhouse
ROSE COTTAGE	H32	The Old Schoolhouse
THE OLD POST OFFICE HOUSE	H33	The Old Schoolhouse
BUNGALOW	H34	The Old Schoolhouse
Unknown 5	H35	The Old Schoolhouse
MUCKLE LYNE	H36	Muckle Lyne
LITTLE LYNE	H37	Muckle Lyne
HEAD FORESTERS HOUSE	H38	The Old Schoolhouse
1 FORESTRY HOUSES	H39	The Old Schoolhouse
2 FORESTRY HOUSES	H40	The Old Schoolhouse
3 FORESTRY HOUSES	H41	The Old Schoolhouse
Unknown 6	H42	The Old Schoolhouse

House Name	House ID	Survey Location
4 FORESTRY HOUSES	H43	The Old Schoolhouse
5-6 FORESTRY HOUSES	H44	The Old Schoolhouse
GLENERNIE HOUSE	H45	Muckle Lyne
WESTER TILLIEGLENS	H46	Muckle Lyne
BALLENRIECH	H47	Muckle Lyne
TILLIEGLENS	H48	Muckle Lyne
RELUGAS 1	H49	Muckle Lyne
RELUGAS 2	H50	Muckle Lyne
AUCHNAGAIRN	H51	Muckle Lyne
TILLIDIVIE HOUSE	H52	Muckle Lyne
MILLS OF AIRDRIE	H53	Muckle Lyne
SCORE	H54	Muckle Lyne
THE MOUNT	H55	Muckle Lyne
THE OLD SCHOOLHOUSE	H56	The Old Schoolhouse

11.89 As recommended in ETSU-R-97, the absolute lower noise limits may be increased up to 45dB(A) if the occupant has a financial involvement in the wind farm. However, whilst some of the nearby properties may qualify for such an increase, these limits have not been adopted in the presented results.

Acoustic Assessment

11.90

Table 11.16 shows a comparison of the predicted noise levels with the recommended daytime noise limits for each residential property where the full assessment procedure is being applied. The predicted noise levels at 1ms-1 and 2ms-1 have been assumed as equal to 3ms-1 as a conservative measure as noise levels at these wind speeds would typically be less. 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.

- 11.91 Table 11.17 shows a comparison with the recommended night-time noise limits.
- 11.92 The daytime noise limits are exceeded at H19 at 7ms-1 by a margin of 0.2dB(A). There is also a marginal (i.e. less than 0.1dB(A)) exceedance at H8 at 6ms-1. A noise management strategy is proposed to reduce the noise levels at these wind speeds such that the daytime noise limits are met.
- 11.93 Noise levels at all locations are within the night-time noise limits at all wind speeds considered. The minimum margin during night-time periods is -0.1dB(A).

Table 11.16 - Comparison of Predicted Noise Levels and Daytime Noise Limits - (dB(A) re 20 µPa)

House ID	Reference Wind Speed, Standardised v_{10} (ms ⁻¹)											
	1			2			3			4		
	L _p	Limit	ΔL	L _p	Limit	ΔL	L _p	Limit	ΔL	L _p	Limit	ΔL
H8	24.3	35.0	-10.7	24.3	35.0	-10.7	24.3	35.0	-10.7	27.2	35.0	-7.8
H11	25.2	36.5	-11.3	25.2	36.5	-11.3	25.2	36.8	-11.6	28.1	37.6	-9.5
H13	24.9	35.0	-10.1	24.9	35.0	-10.1	24.9	35.0	-10.1	27.8	35.0	-7.2
H15	25.0	36.5	-11.5	25.0	36.5	-11.5	25.0	36.8	-11.8	27.9	37.6	-9.7
H19	23.4	35.0	-11.6	23.4	35.0	-11.6	23.4	35.0	-11.6	26.3	35.0	-8.7
H20	22.9	36.5	-13.6	22.9	36.5	-13.6	22.9	36.8	-13.9	25.8	37.6	-11.8
H21	22.4	35.0	-12.6	22.4	35.0	-12.6	22.4	35.0	-12.6	25.3	35.0	-9.7
H24	23.2	35.0	-11.8	23.2	35.0	-11.8	23.2	35.0	-11.8	26.1	35.0	-8.9
H27	22.2	35.0	-12.8	22.2	35.0	-12.8	22.2	35.0	-12.8	25.1	35.0	-9.9
H28	22.2	35.0	-12.8	22.2	35.0	-12.8	22.2	35.0	-12.8	25.1	35.0	-9.9
H36	23.6	35.0	-11.4	23.6	35.0	-11.4	23.6	35.0	-11.4	26.5	35.0	-8.5
H37	23.3	35.0	-11.7	23.3	35.0	-11.7	23.3	35.0	-11.7	26.2	35.0	-8.8
H56	21.4	35.0	-13.6	21.4	35.0	-13.6	21.4	35.0	-13.6	24.3	35.0	-10.7

House ID	Reference Wind Speed, Standardised v_{10} (ms ⁻¹)											
	5			6			7			8		
	L _p	Limit	ΔL	L _p	Limit	ΔL	L _p	Limit	ΔL	L _p	Limit	ΔL
H8	31.4	35.0	-3.6	35.2	35.2	0.0	37.1	38.0	-0.9	37.2	40.7	-3.5
H11	32.3	38.8	-6.5	36.1	40.3	-4.2	38.0	41.9	-3.9	38.1	43.6	-5.5
H13	32.0	37.3	-5.3	35.8	40.3	-4.5	37.7	43.6	-5.9	37.8	47.0	-9.2
H15	32.1	38.8	-6.7	35.9	40.3	-4.4	37.8	41.9	-4.1	37.9	43.6	-5.7
H19	30.5	35.0	-4.5	34.3	35.0	-0.7	36.2	36.0	0.2	36.3	38.4	-2.1
H20	30.0	38.8	-8.8	33.8	40.3	-6.5	35.7	41.9	-6.2	35.8	43.6	-7.8
H21	29.5	35.0	-5.5	33.3	35.0	-1.7	35.2	36.0	-0.8	35.3	38.4	-3.1
H24	30.3	36.8	-6.5	34.1	39.1	-5.0	36.0	41.5	-5.5	36.1	44.1	-8.0
H27	29.3	36.8	-7.5	33.1	39.1	-6.0	35.0	41.5	-6.5	35.1	44.1	-9.0
H28	29.3	36.8	-7.5	33.1	39.1	-6.0	35.0	41.5	-6.5	35.1	44.1	-9.0
H36	30.7	35.0	-4.3	34.5	36.3	-1.8	36.4	38.2	-1.8	36.5	40.2	-3.7
H37	30.4	35.0	-4.6	34.2	36.3	-2.1	36.1	38.2	-2.1	36.2	40.2	-4.0
H56	28.5	36.8	-8.3	32.3	39.1	-6.8	34.2	41.5	-7.3	34.3	44.1	-9.8

House ID	Reference Wind Speed, Standardised v_{10} (ms^{-1})											
	9			10			11			12		
	L_p	Limit	ΔL	L_p	Limit	ΔL	L_p	Limit	ΔL	L_p	Limit	ΔL
H8	37.2	42.9	-5.7	37.2	44.4	-7.2	37.2	44.8	-7.6	37.2	44.8	-7.6
H11	38.1	45.2	-7.1	38.1	46.6	-8.5	38.1	47.7	-9.6	38.1	47.7	-9.6
H13	37.8	50.4	-12.6	37.8	53.6	-15.8	37.8	53.6	-15.8	37.8	53.6	-15.8
H15	37.9	45.2	-7.3	37.9	46.6	-8.7	37.9	47.7	-9.8	37.9	47.7	-9.8
H19	36.3	41.1	-4.8	36.3	44.4	-8.1	36.3	44.4	-8.1	36.3	44.4	-8.1
H20	35.8	45.2	-9.4	35.8	46.6	-10.8	35.8	47.7	-11.9	35.8	47.7	-11.9
H21	35.3	41.1	-5.8	35.3	44.4	-9.1	35.3	44.4	-9.1	35.3	44.4	-9.1
H24	36.1	46.6	-10.5	36.1	49.2	-13.1	36.1	49.2	-13.1	36.1	49.2	-13.1
H27	35.1	46.6	-11.5	35.1	49.2	-14.1	35.1	49.2	-14.1	35.1	49.2	-14.1
H28	35.1	46.6	-11.5	35.1	49.2	-14.1	35.1	49.2	-14.1	35.1	49.2	-14.1
H36	36.5	42.4	-5.9	36.5	44.6	-8.1	36.5	46.8	-10.3	36.5	46.8	-10.3
H37	36.2	42.4	-6.2	36.2	44.6	-8.4	36.2	46.8	-10.6	36.2	46.8	-10.6
H56	34.3	46.6	-12.3	34.3	49.2	-14.9	34.3	49.2	-14.9	34.3	49.2	-14.9

The term L_p is used to denote the predicted noise level due to the operation of the proposed development

The term ΔL is used to denote the difference between the predicted wind farm noise level and the recommended limit

Table 11.17 - Comparison of Predicted Noise Levels and Night Time Limits - (dB(A) re 20 µPa)

House ID	Reference Wind Speed, Standardised v_{10} (ms ⁻¹)											
	1			2			3			4		
	L _p	Limit	ΔL	L _p	Limit	ΔL	L _p	Limit	ΔL	L _p	Limit	ΔL
H8	24.3	38.0	-13.7	24.3	38.0	-13.7	24.3	38.0	-13.7	27.2	38.0	-10.8
H11	25.2	38.0	-12.8	25.2	38.0	-12.8	25.2	38.0	-12.8	28.1	38.0	-9.9
H13	24.9	38.0	-13.1	24.9	38.0	-13.1	24.9	38.0	-13.1	27.8	38.0	-10.2
H15	25.0	38.0	-13.0	25.0	38.0	-13.0	25.0	38.0	-13.0	27.9	38.0	-10.1
H19	23.4	38.0	-14.6	23.4	38.0	-14.6	23.4	38.0	-14.6	26.3	38.0	-11.7
H20	22.9	38.0	-15.1	22.9	38.0	-15.1	22.9	38.0	-15.1	25.8	38.0	-12.2
H21	22.4	38.0	-15.6	22.4	38.0	-15.6	22.4	38.0	-15.6	25.3	38.0	-12.7
H24	23.2	38.0	-14.8	23.2	38.0	-14.8	23.2	38.0	-14.8	26.1	38.0	-11.9
H27	22.2	38.0	-15.8	22.2	38.0	-15.8	22.2	38.0	-15.8	25.1	38.0	-12.9
H28	22.2	38.0	-15.8	22.2	38.0	-15.8	22.2	38.0	-15.8	25.1	38.0	-12.9
H36	23.6	38.0	-14.4	23.6	38.0	-14.4	23.6	38.0	-14.4	26.5	38.0	-11.5
H37	23.3	38.0	-14.7	23.3	38.0	-14.7	23.3	38.0	-14.7	26.2	38.0	-11.8
H56	21.4	38.0	-16.6	21.4	38.0	-16.6	21.4	38.0	-16.6	24.3	38.0	-13.7

House ID	Reference Wind Speed, Standardised v_{10} (ms ⁻¹)											
	9			10			11			12		
	L _p	Limit	ΔL	L _p	Limit	ΔL	L _p	Limit	ΔL	L _p	Limit	ΔL
H8	37.2	42.9	-5.7	37.2	47.2	-10.0	37.2	47.2	-10.0	37.2	47.2	-10.0
H11	38.1	40.5	-2.4	38.1	42.2	-4.1	38.1	42.2	-4.1	38.1	42.2	-4.1
H13	37.8	44.5	-6.7	37.8	46.7	-8.9	37.8	48.5	-10.7	37.8	48.5	-10.7
H15	37.9	40.5	-2.6	37.9	42.2	-4.3	37.9	42.2	-4.3	37.9	42.2	-4.3
H19	36.3	38.0	-1.7	36.3	38.5	-2.2	36.3	41.8	-5.5	36.3	41.8	-5.5
H20	35.8	40.5	-4.7	35.8	42.2	-6.4	35.8	42.2	-6.4	35.8	42.2	-6.4
H21	35.3	38.0	-2.7	35.3	38.5	-3.2	35.3	41.8	-6.5	35.3	41.8	-6.5
H24	36.1	41.3	-5.2	36.1	41.8	-5.7	36.1	41.8	-5.7	36.1	41.8	-5.7
H27	35.1	41.3	-6.2	35.1	41.8	-6.7	35.1	41.8	-6.7	35.1	41.8	-6.7
H28	35.1	41.3	-6.2	35.1	41.8	-6.7	35.1	41.8	-6.7	35.1	41.8	-6.7
H36	36.5	39.0	-2.5	36.5	40.5	-4.0	36.5	40.5	-4.0	36.5	40.5	-4.0
H37	36.2	39.0	-2.8	36.2	40.5	-4.3	36.2	40.5	-4.3	36.2	40.5	-4.3
H56	34.3	41.3	-7.0	34.3	41.8	-7.5	34.3	41.8	-7.5	34.3	41.8	-7.5

The term L_p is used to denote the predicted noise level due to the operation of the proposed development

The term ΔL is used to denote the difference between the predicted wind farm noise level and the recommended limit

House ID	Reference Wind Speed, Standardised v_{10} (ms ⁻¹)											
	5			6			7			8		
	L _p	Limit	ΔL	L _p	Limit	ΔL	L _p	Limit	ΔL	L _p	Limit	ΔL
H8	31.4	38.0	-6.6	35.2	38.0	-2.8	37.1	38.0	-0.9	37.2	39.0	-1.8
H11	32.3	38.0	-5.7	36.1	38.0	-1.9	38.0	38.1	-0.1	38.1	39.2	-1.1
H13	32.0	38.0	-6.0	35.8	38.0	-2.2	37.7	39.5	-1.8	37.8	42.1	-4.3
H15	32.1	38.0	-5.9	35.9	38.0	-2.1	37.8	38.1	-0.3	37.9	39.2	-1.3
H19	30.5	38.0	-7.5	34.3	38.0	-3.7	36.2	38.0	-1.8	36.3	38.0	-1.7
H20	30.0	38.0	-8.0	33.8	38.0	-4.2	35.7	38.1	-2.4	35.8	39.2	-3.4
H21	29.5	38.0	-8.5	33.3	38.0	-4.7	35.2	38.0	-2.8	35.3	38.0	-2.7
H24	30.3	38.0	-7.7	34.1	38.0	-3.9	36.0	38.0	-2.0	36.1	39.8	-3.7
H27	29.3	38.0	-8.7	33.1	38.0	-4.9	35.0	38.0	-3.0	35.1	39.8	-4.7
H28	29.3	38.0	-8.7	33.1	38.0	-4.9	35.0	38.0	-3.0	35.1	39.8	-4.7
H36	30.7	38.0	-7.3	34.5	38.0	-3.5	36.4	38.0	-1.6	36.5	38.0	-1.5
H37	30.4	38.0	-7.6	34.2	38.0	-3.8	36.1	38.0	-1.9	36.2	38.0	-1.8
H56	28.5	38.0	-9.5	32.3	38.0	-5.7	34.2	38.0	-3.8	34.3	39.8	-5.5

Noise Management

- 11.94 A noise management strategy can be implemented to reduce the predicted noise levels to below the daytime noise limit. This involves operating certain turbines within the proposed development in reduced noise mode in certain conditions. The Vestas V117-4.2MW machine has three reduced noise modes whereby the pitch of the turbine blades can be altered, sacrificing power production, to decrease the amount of noise produced. Acoustic emission data for the available noise modes, with the inclusion of a 2dB(A) allowance for measurement uncertainty, is shown in **Table 11.18**.

Table 11.18: Reduced Noise Modes for the Vestas V117-4.2MW Wind Turbine

Standardised 10m Height Wind Speed, v_{10} (ms^{-1})	Mode 1	Mode 2	Mode 3
3	95.1	95.1	95.1
4	98.0	98.0	98.0
5	102.2	102.1	101.9
6	105.5	104.0	102.9
7	106.9	104.3	103.0
8	107.0	104.5	103.0
9	107.0	104.9	103.0
10	107.0	105.0	103.0
11	107.0	105.0	103.0
12	107.0	105.0	103.0

- 11.95 An example of a noise management strategy which would allow the daytime noise limit to be met is provided in **Table 11.19**. The strategy is only shown for standardised 10m wind speeds where the limit is predicted to be exceeded. The turbines would operate in their standard mode of operation ('Mode 0') at all other wind speeds. There are many different combinations of turbines operating in different modes which would result in the limit being met and this is just one example to demonstrate the principle rather than being optimised from an energy capture perspective.

Table 11.19: Daytime Noise Management Strategy

Standardised 10m Height Wind Speed, v_{10} (ms^{-1})	6	7
T1	Mode 0	Mode 0
T2	Mode 1	Mode 0
T3	Mode 0	Mode 0
T4	Mode 0	Mode 0

Standardised 10m Height Wind Speed, v_{10} (ms^{-1})	6	7
T5	Mode 0	Mode 0
T6	Mode 0	Mode 0
T7	Mode 0	Mode 0
T8	Mode 0	Mode 0
T9	Mode 0	Mode 0
T10	Mode 0	Mode 0
T11	Mode 0	Mode 1
T12	Mode 0	Mode 0
T13	Mode 0	Mode 0
T14	Mode 0	Mode 0
T15	Mode 0	Mode 1
T16	Mode 0	Mode 0

- 11.96 Predicted noise levels at H8 with the above noise management strategy in place are provided in **Table 11.20**. Predicted noise levels at H19 with the above noise management strategy in place are provided in
- 11.97 **Table 11.21**. The margin between these mitigated predicted noise levels and the daytime limit is also shown and there are no longer any exceedances.

Table 11.20: Assessment of Mitigated Noise Levels at H8

Wind Speed (ms^{-1})	1	2	3	4	5	6	7	8	9	10	11	12
Mitigated Noise Level	24.3	24.3	24.3	27.2	31.4	35.1	37.1	37.2	37.2	37.2	37.2	37.2
Daytime Limit	35.0	35.0	35.0	35.0	35.0	35.2	38.0	40.7	42.9	44.4	44.8	44.8
Margin	-10.7	-10.7	-10.7	-7.8	-3.6	-0.1	-0.9	-3.5	-5.7	-7.2	-7.6	-7.6

Table 11.21: Assessment of Mitigated Noise Levels at H19

Wind Speed (ms ⁻¹)	1	2	3	4	5	6	7	8	9	10	11	12
Mitigated Noise Level	23.4	23.4	23.4	26.3	30.5	34.3	36.0	36.3	36.3	36.3	36.3	36.3
Daytime Limit	35.0	35.0	35.0	35.0	35.0	35.0	36.0	38.4	41.1	44.4	44.4	44.4
Margin	-11.6	-11.6	-11.6	-8.7	-4.5	-0.7	0.0	-2.1	-4.8	-8.1	-8.1	-8.1

11.98 The predicted noise levels due to the proposed development with the daytime noise management strategy in place are shown in comparison to the noise limit in **Chart 11.16** for H8 and **Chart 11.17** for H19.

11.99 The presented noise management strategy is designed such that the limit would be met assuming the properties in question are downwind of the proposed development at all times. The amount of noise management required is likely to reduce for certain wind directions should an assessment considering the attenuation applicable when properties are located crosswind or upwind of the proposed development be undertaken.

Cumulative Effects

11.100 There are not anticipated to be any significant cumulative effects due to the separation distances between the proposed development and other wind farm schemes. The operational Hill of Glaschyle site is 8km north-east, the operational Berry Burn site is 10km to the east and the operational Paul’s Hill site is 14km to the east. The proposed extensions to Berry Burn and Paul’s Hill are both further than the original schemes from the proposed development. The most westerly section of the proposed Clash Gour scheme is 8km to the east.

11.101 This is consistent with the cumulative acoustic assessments of the proposed Berry Burn Extension²¹ and Paul’s Hill II²² which do not consider consented development and the cumulative acoustic assessment of the proposed Clash Gour scheme in which the acoustic emissions from the consented development are deemed negligible²³. Each of these assessments was made following the consented development which was granted consent in October 2017.

Potential Construction Impacts

Construction Noise Assessment

11.102 Primary activities creating noise during the construction period are from: the construction of the turbine bases; the erection of the turbines; the excavation of trenches for cables; and the construction of associated hard standings, access tracks and construction compound. Noise from vehicles on local roads and access tracks would also arise due to the delivery of turbine components and construction materials, notably aggregates, concrete and steel reinforcement.

11.103 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

11.104 The plant assumed for each construction activity is shown in **Table 11.22**. The number of items indicates how many of each plant are required 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 11.22: Construction Phases and Sound Power Levels

Activities	Plant	Sound Power (L _{WA})	No. Items	Activity Duration (%)	Effective Sound Power (L _{WA})
Construct Temporary site compounds	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	

²¹ Berry Burn Wind Farm Extension, EIA Report, Chapter 14 – Noise, Statkraft, July 2020

²² Paul’s Hill II Wind Farm, Environmental Statement, Chapter 13.3, Noise Assessment, Hayes McKenzie, April 2018

²³ Clash Gour Wind Farm, Technical Appendix 12.1 – Noise and Vibration Assessment, Hoare Lea, November 2018

Activities	Plant	Sound Power (L _{WA})	No. Items	Activity Duration (%)	Effective Sound Power (L _{WA})
	Excavator mounted rock breaker	121	1	33	
Construct Substations	Tracked excavator	113	1	100	117
	Concrete mixer truck	108	2	50	
	Lorry	108	1	50	
	Telescopic Handler	99	1	100	
	Piling Rig	117	1	50	
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	123
	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	
	Piling Rig	117	1	100	
Poker vibrator	106	3	50		

Activities	Plant	Sound Power (L _{WA})	No. Items	Activity Duration (%)	Effective Sound Power (L _{WA})
	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 Turbine	Mobile telescopic crane	110	2	75	119
	Lorry	108	1	75	
	Diesel generator	102	1	100	
	Torque guns	111	4	100	
Reinstate Crane Bases	Tracked excavator	113	1	75	115
	Dump truck	113	1	75	
Lay Cable to Substations	Wheeled loader	108	1	100	117
	Saw	114	1	50	
	Hand-held pneumatic breaker	111	1	50	
	Dump truck	113	1	75	
	Tipper lorry	107	1	50	
	Vibratory plate	108	1	75	
	Tandem roller	102	1	75	
	Tractor (Towing Trailer)	107	1	50	

Activities	Plant	Sound Power (L _{WA})	No. Items	Activity Duration (%)	Effective Sound Power (L _{WA})
	Lorry	108	1	75	
Borrow Pits	Excavator mounted rock breaker	121	1	100	126
	Dump truck	113	2	75	
	Dozer	109	1	100	
	Tracked semi-mobile crusher	124	1	100	
	Tracked excavator	113	1	100	
Construct Batching Plant	Tracked excavator	113	1	67	116
	Dump truck	113	1	67	
	Tipper lorry	107	1	67	
	Vibratory roller	102	1	67	
	Lorry	108	1	67	
	Mobile telescopic crane	110	1	67	
Operational Batching Plant	Water pump/siltbuster	111	1	67	109

Table 11.23: Predicted Sound Pressure Level due to Construction Noise (dB L_{Aeq})

Activity	H8	H11	H13	H19	H35	H36
Construct crane hardstandings	46.2	45.7	45.7	44.3	43.6	45.3
Construct site tracks	47.6	47.1	47.1	45.7	45.0	46.8
Construct Substations	32.8	34.7	36.8	37.9	40.3	45.5
Construct Temporary site compounds	40.9	37.9	38.9	42.5	42.2	46.5
Construct Turbine Foundations	49.1	48.6	48.6	47.2	46.5	48.2
Erect Turbine	44.5	44.0	44.0	42.6	41.9	43.6
Excavate and Lay site Cables	47.4	46.9	46.9	45.5	44.8	49.6
Lay Cable to Substations	43.3	42.8	42.8	41.4	40.7	45.5
Reinstate Crane Bases	40.5	40.0	40.0	38.6	37.9	39.6
Borrow Pits	47.4	46.8	46.8	47.3	44.9	45.2
Construct Batching Plant	38.0	35.0	34.8	38.5	35.0	34.3
Operational Batching Plant	31.1	28.1	27.9	31.6	28.1	27.4

11.105 Predictions of construction noise levels have been carried out using the methods prescribed in Annex F of BS 5228-1:2009²⁴. The worst case scenario, where each construction activity takes place at the nearest proposed location to the residential property being assessed, is considered. The locations of the construction activities are taken from the infrastructure drawing. The results of these predictions, made at six representative residential properties, are shown in **Table 11.23**.

11.106 In all cases average noise levels over the construction period would be lower as the worst case is presented for when the activities are closest to the residential property.

11.107 In addition to the construction work to be undertaken on site there is also a proposal for some works to allow turbine blade deliveries to navigate a corner in Ferness. Noise levels are expected to exceed 65dB(A) at the nearest property, H27, for a period of two days whilst the new track is being constructed. Noise levels of 85.7dB(A) are predicted when the works are at their closest point, decreasing to 69.7dB(A) when the works are at their furthest point.

Construction Traffic

11.108 Due to the delivery 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 shown in **Chapter 10: 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.

11.109 It is estimated that a total of 140 two-way vehicle movements per day would be required during the most intense period of construction activity although this would only be the case for a maximum of 16 days during foundation pouring. This is a worst case and the amount of traffic on surrounding roads would be reduced if onsite batching is feasible.

11.110 Construction traffic noise has been quantified using the method described in BS 5228:2009 Part 1. Using the distances from residential properties to the centre of the relevant carriageway where site traffic would be, the noise levels predicted are presented in **Table 11.24**. The maximum sound pressure level due to traffic flows during the most intensive period of activity is predicted to be 63.9dB LAeq. The property where this occurs is adjacent to the proposed delivery route and, as such, corresponds to the worst case.

²⁴ A 50% mixed ground attenuation has been used throughout to conservatively account for the arable nature of ground conditions in the vicinity of the proposed development

Table 11.24: Traffic Noise Predictions by Activity (dB L_{Aeq})

House ID	Dump Truck	Lorries	Concrete Mixer
H8	42.7	35.8	38.8
H11	42.5	35.6	38.6
H13	42.5	35.6	38.6
H19	44.4	37.5	40.5
H35	61.8	55.0	58.0
H36	42.3	35.5	38.5

11.111 The increase in noise level due to the presence of construction traffic on nearby roads has been quantified using the methodology set out in CRTN²⁵. The maximum predicted increase in daytime average traffic noise level, during the most intense period of construction, is 2.1dB(A) on the A939 at the site access point. Given that a 3dB(A) change is commonly regarded as the smallest subjectively perceptible difference in noise level, the predicted short-term change in traffic noise levels are considered negligible and not significant.

General Construction Noise in Conjunction with Traffic Noise

11.112 Worst case construction noise levels may arise when the following simultaneous activities occur: construction of nearest access tracks; construction of the site compound; construction of substation; construction of nearest crane hard-standings; the excavation and laying of cables; and construction of nearest turbine foundations. Therefore cumulative predictions of these construction activities and the additional noise contribution from construction traffic have been calculated and are shown in Table 11.25.

11.113 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.

Table 11.25: Predicted Noise Due to Combined Traffic Noise and Turbine Construction (dB L_{Aeq})

House ID	Construction Plant Noise	Traffic Noise	Combined Noise
H8	54.0	44.8	54.5
H11	53.4	44.6	53.9
H13	53.5	44.6	54.0
H19	52.5	46.5	53.5
H35	52.0	63.9	64.2
H36	55.0	44.4	55.4

Assessment of Construction Noise

11.114 In accordance with the ABC method of Annex E of BS 5228-1:2009, due to the relatively low levels of ambient noise in the vicinity of the proposed development, a Category A assessment is appropriate. This category sets significant effect threshold LAeq criteria of: 65dB(A) during

weekdays (0700-1900) and Saturdays (0700-1300); 55dB(A) at evenings and weekends; and 45dB(A) for night-time (2300-0700) periods.

11.115 Table 11.25 shows that predicted noise levels from the combined effect of increased traffic flows and activities associated with the peak of construction activities are below the 65dB(A) daytime threshold specified by BS 5228-1:2009 at all of the assessed residential properties. Construction noise due to works to enable access through Ferness is expected to exceed 65dB(A) at the nearest properties for a period of two days.

11.116 Table 11.25 shows that construction noise levels are predicted to exceed the 55dB(A) threshold for evenings and weekends at two of the assessed properties although, of the times when this criterion applies, construction is only scheduled to take place on Saturdays 1300-1900 with the exception of turbine erection and commissioning or periods of emergency work.

11.117 An assessment against the night-time threshold has not been undertaken as construction work is not scheduled to take place during the night with the exception of turbine erection and commissioning or periods of emergency work.

11.118 The predictions made represent the worst-case combination of most intensive traffic activity with simultaneous construction activity at the nearest possible location to each residential property.

Assessment of Vibration due to Blasting

11.119 BS 5228-2:2009 provides guidance on the assessment of vibration due to blasting. A scaled distance graph is shown in Figure E.1 in Annex E of BS 5228.2:2009 which provides an indication of likely vibration magnitudes at various distances. This figure can be used to determine the level of vibration which would not be expected to be exceeded in 95 % of blasts for a given distance and charge size.

11.120 BS 6472-2:2008 details the maximum satisfactory magnitudes for vibration measured on a firm surface outside buildings with respect to human response. For up to three blast vibration events per day the generally accepted maximum satisfactory magnitude at residential premises during daytime periods (0800-1800 Monday to Friday and 0800-1300 on Saturdays) is a peak particle velocity (ppv) of 6.0 to 10.0mms⁻¹. In practice, the lower satisfactory magnitude should be used with the higher magnitude being justified on a case-by-case basis.

11.121 For a charge size of 1000 kg the estimated vibration magnitude is 3.7mms⁻¹ at the nearest residential property to the borrow pit which is approximately 1668m away. This suggests that the probability of adverse comment is low.

²⁵ Calculation of Road Traffic Noise (CRTN), HMSO Department of Transport, 1988.

Mitigation

Operational Noise

- 11.122 One of the key constraints and considerations in designing the layout of the turbines was the minimisation of potential noise impacts at the nearest residential receptors. As such the turbine layout was designed to ensure that there is an adequate separation distance between any of the proposed turbines and the nearest residential property.
- 11.123 Due to this consideration of the noise impacts in the design of the wind farm, embedding mitigation measures in the turbine layout, when a conservative candidate machine is modelled a limited amount of noise management is required to meet noise limits derived in accordance with ETSU-R-97.
- 11.124 Noise management involves altering the operational mode of the turbines in certain conditions by changing the pitch of the blades, resulting in a trade-off between power production and noise reduction. This provides a potential mechanism for further reducing the level of noise experienced at nearby residential properties although the acoustic assessment demonstrates that this is not required.
- 11.125 If consent is granted for the proposed development, conditions can be proposed to provide a degree of protection to nearby residents in the form of limits relating to noise level and tonality.
- 11.126 **Appendix 11.8** contains a set of conditions that the Applicant considers appropriate.

Construction Noise

- 11.127 For all activities, measures would 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.
- 11.128 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 and Community Liaison Group should occur to inform residents of intended activity. Non-acoustic factors, which influence the overall level of complaints such as mud on roads and dust generation, would also be controlled through construction practices adopted on the site.
- 11.129 Furthermore, the following noise mitigation options will be implemented where appropriate:
- Consideration would be given to noise emissions when selecting plant and equipment to be used on site;
 - All equipment should 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
 - The movement of vehicles to and from the site would be controlled and employees instructed to ensure compliance with the noise control measures adopted.
- 11.130 Site operations would 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 to adhere to the 55dB(A) target level for Saturdays 1300-1900, the following mitigation measures would be considered:
- Reduce the number of construction activities occurring simultaneously;
 - Restrict the distance of construction activity from nearby properties during these times; and
 - Reduce construction traffic as appropriate.
- 11.131 The use of acoustic barriers could be considered to reduce construction noise levels during the works to enable turbine blade deliveries through Ferness.
- 11.132 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.
- 11.133 With specific regard to blasting, it is proposed that the following mitigation measures are implemented:
- Good practice on blasting, as recommended by Planning Advice Note (PAN) 50 'Controlling the environmental effects of surface mineral workings'²⁶ shall be followed;
 - The vibration and air overpressure reduction methods outlined in Section 8.6.9.2 of BS 5228-2:2009 shall be adhered to where appropriate;
 - Advance warning shall be given to nearby residents;
 - Blasting will only occur between the hours of 0800-1800 on Mondays-Fridays or between the hours of 0800-1300 on Saturdays; and
 - No more than three blasts per day will occur.
- 11.134 Depending upon the charge sizes required it may be prudent to perform trial blasts with smaller amounts of explosive and measure vibration magnitudes at various distances to more accurately determine how vibration propagates at the site.

²⁶ The Scottish Office, 1996. Planning Advice Note (PAN) 50 'Controlling the environmental effects of surface mineral workings'

Residual Effects

Operational

- 11.135 The acoustic assessment demonstrates that predicted noise levels at all residential properties do not exceed the derived noise limits across all wind speeds. This should not be interpreted to mean that wind farm operational noise would be inaudible (or masked by background noise) under all conditions, but that the levels of noise are acceptable under ETSU-R-97 and associated guidance.

Construction

- 11.136 Noise levels of greater than 65dB(A) are predicted due to the work to enable turbine blade deliveries through Ferness although this is only expected to be the case for two days. Noise levels above the 55dB(A) criteria level for Saturdays 1300-1900 are predicted at two properties although this can be mitigated by restricting the activities that are allowed to take place as necessary. At all other times predicted noise from the worst case combination of increased traffic and site construction noise would not exceed relevant criteria and therefore no significant impacts are expected.

Summary

- 11.137 The acoustic impact for the operation of the proposed development on nearby residential properties 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', otherwise known as ETSU-R-97, and Institute of Acoustics Good Practice Guide (IoA GPG), as recommended for use by relevant planning policy.
- 11.138 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 and the IoA GPG.
- 11.139 The predicted operational noise levels, with the suggested noise management strategy in place, are within noise limits derived in accordance with ETSU-R-97 at all properties at all considered wind speeds.
- 11.140 A construction noise assessment carried out in accordance with BS 5228-1:2009 'Noise control on construction and open sites Part 1 - Noise' found that construction noise levels are predicted to temporarily exceed construction noise criteria at nearby properties although appropriate mitigation measures have been identified.
- 11.141 Vibration and air overpressure due to blasting are not expected to have a significant impact on nearby residents should the mitigation measures described within be adopted.
- 11.142 The potential impact of the proposed development, along with the mitigation proposed and any residual impact, is summarised in **Table 11.26**.

Table 11.26: Summary of Potential Impacts, Mitigation and Residual Impacts

Potential Impact	Mitigation Proposed	Means of Implementation	Outcome/Residual Impact
Operation			
Potential impact on residential amenity due to operational noise	Impact is deemed to be acceptable as wind farm meets noise limits specified by relevant guidance with a noise management strategy in place No additional mitigation measures are required due to absence of identified significant effect	Not applicable	Not significant
Construction			
Potential for noise to be created during general construction activities and by construction traffic	Due regard for 'best practicable means' (defined by Section 72 of the Control of Pollution Act 1974) A range of noise mitigation measures are proposed for the construction phase in accordance with measures outlined in BS 5228-1:2009 Site operations to be limited to 0700-1900 Monday to Saturday (except during turbine erection and commissioning / periods of emergency work) Blasting specific mitigation measures consistent with PAN 50 and BS 5228-2:2009	Noise mitigation measures would be implemented as part of the Construction and Environmental Management Plan which would be required to be agreed as a condition of consent	Not significant

Chapter 12: Socio-Economics, Tourism and Recreation

12. Socio-Economics, Recreation and Tourism

Introduction

- 12.1 This chapter considers the potential social and economic effects of the proposed Cairn Duhie wind farm (hereafter referred to as ‘the proposed development’). It details the likely effects on employment generation and any likely direct and indirect economic benefits as a result of the proposed development. It also considers potential effects in relation to public access, recreation and tourism. The specific objectives of the chapter are to:
- describe the socio-economic baseline;
 - describe the assessment methodology and significance criteria used in completing the impact assessment;
 - describe the potential effects, including direct, indirect and cumulative effects;
 - describe the mitigation measures proposed to address likely significant effects;
 - assess the residual effects remaining following the implementation of mitigation.
- 12.2 The implications of the Covid-19 pandemic on Scotland's economy as a whole has highlighted the important role that the investment in renewables can play in helping Scotland rebuild its economy whilst increasing its resilience to climate change. In this way, the positive employment and economic effects of the proposed development are brought into sharp focus in the context of Scotland's current economic situation.
- 12.3 The socio-economic assessment has been undertaken by experienced EIA practitioners at LUC who have undertaken such assessments for a number of wind farm developments in the UK.
- 12.4 The chapter is supported by Figure 12.1 which shows the location of public access and recreational routes within 40km¹, and which is referenced in the text where relevant. An Access Management Plan is provided as Appendix 12.1.

Planning

- 12.5 The policies relevant to this assessment within the Highland-Wide Local Development Plan (2012) are:
- Policy 43: Tourism;
 - Policy 67: Renewable Energy Developments;
 - Policy 77: Public Access; and
 - Policy 78: Long Distance Routes.

- 12.6 Detailed information relating to relevant international, national and local planning policy and legislation is provided in the Planning Statement.

Scope of Assessment

- 12.7 The scope of the assessment has been informed by issues identified from the consultation responses received at the EIA Scoping stage, further informed by professional judgement.

Effects Assessed in Full

- 12.8 The following effects have been considered:
- Direct employment and economic benefits during construction and operation of the proposed development and associated indirect employment and economic benefits, such as effects on local commerce;
 - Indirect effects on recreational activities (such as effects on the visual amenity of users of recreational routes) during construction and operation;
 - Direct effects of the proposed development on public access (including rights of way (RoW), core paths and other routes) and tourism during construction and operation; and
 - Cumulative effects of the proposed development on employment and economic benefits, public access and recreation and tourism during construction and operation in conjunction with other wind farms within 40km.
- 12.9 An assessment of the effects of the proposed development on recreational amenity during construction and operation relating to visibility is considered in Chapter 5: Landscape and Visual Impact Assessment. Where relevant, this chapter makes reference to Chapter 5: Landscape and Visual Impact Assessment to describe the likely indirect effects of the proposed development on the visual amenity of users of recreational routes and also tourists.

Effects Scoped Out

- 12.10 Based on knowledge of the site, direct effects on formal recreation (i.e. activities which require purpose-built facilities such as pitches, tracks etc.) during construction and operation of the wind farm have been ‘scoped out’ of detailed assessment.

Assessment Methodology

- 12.11 There is no established guidance for undertaking a social and economic assessment as part of a wider EIA. This assessment uses desk-based information sources to assess the likely scale of effects, supplemented by consultation with local stakeholders, the findings of other relevant chapters as noted above, and LUC’s previous experience in undertaking socio-economic assessments.

¹ 40km is used as this correlates with the study area used in the Landscape and Visual Impact Assessment.

Consultation

12.12 In undertaking the assessment, consideration has been given to the scoping responses and other consultation undertaken as detailed in Table 12.1 below.

Table 12.1: Consultation Responses

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action
The Highland Council (THC)	Formal Scoping Consultation	Advised that the chapter should present information on the receptors most likely to be affected by the development which may include individual households, local communities, tourists, tourist related businesses, and recreational groups.	It is not considered appropriate or proportionate to consider specific households or businesses individually therefore the assessment considers overall effects on socio-economics, tourism and recreation during construction and operation of the proposed development.
		The EIA Report should include relevant economic information connected with the project, including the potential number of jobs, and economic activity associated with the procurement, construction, operation and decommissioning of the development.	At the time of writing the number of jobs is unknown, however a qualitative assessment of the potential economic effects associated with construction and operation of the proposed development has been undertaken.
		Advised that there are core paths and public rights of way in this area which are likely to be affected during construction and operation phases.	Potential effects on core paths and public rights of way have been considered in this chapter and the locations of these are shown on Figure 12.1.

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action
		The development's potential impact on the Affric-Kintail Way long distance route should be considered.	It is assumed that this reference should be to the Dava Way, which is located within 5km of the proposed development ² . The Dava Way is considered below.
East Nairnshire Community Council	Formal Scoping Consultation	Reference should be made to the Scottish Governments best practice guidelines on community benefit fund commitments.	This document is referenced within the 'Existing Conditions' section of this chapter.
		A statement on the developer's policy towards householder compensation for loss of value in their properties is requested.	Research shows there is no devaluation in property prices nearby once a wind farm is operating, therefore no compensation would be required ³ .

Baseline Characterisation

Study Area

12.13 The study area for the assessment comprises the site and immediate surrounding area in relation to potential effects on recreation, access and land use, and the wider THC area in relation to potential social and economic effects, including effects on tourism. Recreational routes within 40km of the proposed development are illustrated on Figure 12.1.

Desk Study

12.14 The following data sources were used to inform the assessment:

- The Scottish Economic Strategy 2015⁴;
- The Scottish Tourism Strategy 2012⁵;
- The Scottish Index for Multiple Deprivation (2020)⁶;
- National Records of Scotland data⁷;

² The Affric-Kintail way is located between Drumnadrochit on Loch Ness to Morvich in Kintail.

³ Impact of wind turbines on house prices in Scotland, October 2016, ClimateXChange. Available at https://www.climatechange.org.uk/media/1359/cxc_wind_farms_impact_on_house_prices_final_17_oct_2016.pdf.

⁴ Scottish Government, (2015), 'Scotland's Economic Strategy', Available [online] at:

<https://www.gov.scot/publications/scotlands-economic-strategy/>

⁵ Tourism Scotland 2020, (2012), 'A Strategy for Leadership and Growth: The Future of our Industry in our Hands', Available [online] at: <https://scottishtourismalliance.co.uk/wp-content/uploads/2019/03/Tourism-Scotland-2020-final.pdf>

⁶ RigsidelandDouglasWaterCommunityActionPlanFinal.pdf

⁷ National Records of Scotland, (2019), 'South Lanarkshire Council Area Profile', Available [online] at:

<https://www.nrscotland.gov.uk/files/statistics/council-area-data-sheets/south-lanarkshire-council-profile.html>

- The Nomis (Office for National Statistics) labour market statistics website⁸;
- VisitScotland (Tourism in Scotland’s Regions statistics)⁹;
- The Scottish Governments best practice guidelines on community benefit fund commitments¹⁰;
- The Scottish Tourism Alliance (various documents);
- The Highland Council’s Inner Moray Firth Local Development Plan¹¹;
- Key Statistics from the Highlands and Islands Enterprise¹²;
- The Highlands and Islands Enterprise Strategy¹³;
- A number of studies relating to the public attitudes to wind farms (referenced as appropriate throughout text);
- Tourism statistics (from various websites and specific tourist attractions in the area); and,
- Local websites (referenced as appropriate throughout text).

Field Survey

12.15 This assessment is wholly desk based; no field work was undertaken. Details of field survey work undertaken to inform the landscape and visual amenity assessment, the findings of which have been referenced in preparation of this chapter, is set out in Chapter 5: Landscape and Visual Impact Assessment.

Assessing Significance

Significance Criteria

- 12.16 The significance criteria, provided in Table 12.2 below, are based on professional judgement and previous experience of undertaking socio-economic assessments. The criteria primarily consider the magnitude of effects (e.g. the number of people, recreational activities or economic activities affected). However, when applying the criteria, professional judgement has been employed and consideration taken of the receptor sensitivity, where appropriate.
- 12.17 It should be noted that the present economic circumstances in Scotland as brought about by the Covid-19 pandemic, and discussed below, means that the magnitude of change for employment and economic benefits could be considered to be higher than assessed under the current baseline as a result of the proposed development providing a much needed local economic stimulus, thus rendering the assessment as conservative.

12.18 Effects associated with the construction phase of the proposed development are considered to be temporary and short-term and effects during operation are considered to be long-term permanent effects.

Table 12.2: Significance Criteria

Significance of Effect	Description
Major	Where the extent of the effects on economic activities, local businesses, recreation, tourism or the local population is large in scale or magnitude, and a large number of people or activities will be affected (either positively or negatively).
Moderate	Where the extent of effects on economic activities, local businesses, recreation, tourism or the local population is small in scale or magnitude, but a large number of people or activities will be affected (either positively or negatively). or Where the extent of effects on economic activities, local businesses, recreation, tourism, or the local population is large in scale or magnitude, but only a small number of people or activities will be affected (either positively or negatively).
Minor	Where the extent of effects on economic activities, local businesses, recreation, tourism or the local population is small in scale or magnitude and will only affect a small number of people (either positively or negatively).
Negligible	Where the extent of effects on economic activities, local businesses, recreation, tourism, or the local population is barely noticeable in scale or magnitude and will only affect a small number of people or activities (either positively or negatively).

12.19 Major’ and ‘moderate’ effects are considered to be significant in the context of the EIA Regulations¹⁴.

Assessment Limitations

- 12.20 There are no standards or adopted guidance on how to assess socio-economic, tourism and recreational effects. This assessment, as well as the significance criteria used and data sources consulted, is based on professional judgement and previous experience of undertaking socio-economic, tourism and recreation assessments.
- 12.21 Employment and economic decline forecasts for The Highland Council area as a result of the Covid-19 pandemic are not yet known, however it is assumed that this will occur in the short to medium term in line with projections for Scotland as a whole¹⁵. Therefore, the significance of construction employment and economic benefits of the proposed development are assessed

⁸ NOMIS Official Labour Market Statistics, (2019), ‘Labour Market Profile: Highland’, Available [online] at: <https://www.nomisweb.co.uk/reports/lmp/la/1946157421/report.aspx>

⁹ VisitScotland, (2017), ‘Tourism in Scotland’s Regions 2016’, Available [online] at: <https://www.visitscotland.org/research-insights/regions>

¹⁰ The Scottish Government, (2019), ‘Scottish Government Good Practice Principles for Shared Ownership and Community Benefit of Onshore Renewable Developments’, Available [online] at: <https://www.gov.scot/publications/scottish-government-good-practice-principles-community-benefits-onshore-renewable-energy-developments/>

¹¹ The Highland Council, (2015), ‘Inner Moray Firth Local Development Plan’, Available [online] at: https://www.highland.gov.uk/downloads/file/15008/adopted_inner_moray_firth_local_development_plan

¹² Highlands and Islands Enterprise, (2019), ‘Inner Moray Firth Key statistics’, Available [online] at: <https://www.hie.co.uk/media/6340/innerplusmorayplusfirthpluskeyplusstatisticsplus2019.pdf>

¹³ The Highlands and Islands Enterprise, (no date), ‘2019-2022 Strategy’, Available [online] at: <https://www.hie.co.uk/media/5006/strategyplusplanplus2019-2022-1.pdf>

¹⁴ Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017

¹⁵ Scottish Government, 2020, Towards a Robust, Resilient Wellbeing Economy for Scotland’

against the current baseline, albeit the magnitude of change of the effects could be higher than assessed. The assessment is therefore considered to be conservative.

- 12.22 The employment and economic baseline does not take into account future changes as a result of the Covid-19 pandemic on the local and national economy i.e. job losses. Similarly, tourism baseline does not take into account current or future tourist activity trends as a result of Covid-19 restrictions; therefore the assessment has been undertaken assuming a maximum case baseline.

Baseline Conditions

Current Baseline

- 12.23 This section details:
- the current socio-economic conditions within The Highland Council administrative area, including population, demographics and employment;
 - tourism and recreational information and statistics within the respective Study Areas; and
 - published study findings on public attitudes to wind farms, specifically in terms of amenity and local residents and effects on tourism.

Population profile

- 12.24 According to the National Records of Scotland¹⁶, as of 30th June 2019, THC had an estimated population of 235,830 (an increase of 0.1% on the previous year) which is the 7th highest population of all 32 council areas in Scotland.
- 12.25 Between 2018 and 2028 THC's population is expected to increase by 0.5% from 235,540 to 236,664 people. This overall projected increase includes projected increases in the 75 and over age group (34.2%), 65 to 74 age groups (9.0%) and 25 to 44 age groups (2.2%). Conversely, population decreases are expected in the 0 to 15 age group (-11.0%), 16 to 24 (-3.3%) and 45 to 64 age group (7.7%). This projection is anticipated as a general trend across Scotland as a whole. An increase in the number of older people is likely to result in greater demands on the social and healthcare systems in THC and throughout Scotland.
- 12.26 In terms of local population, the Inner Moray Firth had a population of 157,934 in 2018. This includes the settlements of Inverness, Nairn and Dingwall and is the most densely populated area of THC¹⁷ with a population density of 20 people per sq km, but is lower than the Scottish average (70 people per sq km)¹⁸.

Deprivation

- 12.27 The Scottish Index of Multiple Deprivation (SIMD) 2020¹⁹ is the Scottish Government's official tool for identifying concentrations of deprivation in Scotland. SIMD20 is the Scottish Government's sixth edition since 2004 and is based on work conducted by Oxford University in 1999.
- 12.28 The SIMD measures area deprivation based on seven domains namely, income, education, skills and training, employment, health, geographic access to services, housing and crime. These domains are measured using a number of indicators to form ranks for each domain. Data zones are ranked from 1 being the most deprived to 6,976 being the least deprived. Each of the seven domain ranks are then combined to form the overall SIMD. This provides a measure of relative deprivation at data zone level, so it demonstrates that one data zone is relatively more deprived than another but not how much more deprived.
- 12.29 The proposed development lies wholly within one datazone (S01010553), however its eastern boundary joins a another datazone (S01011168) and Table 12.3 below sets out the domain rankings.

Table 12.3: SIMD Scores for Local Communities

Datazone	Income	Jobs	Health	Education	Housing	Geographic access	Crime	Rankings
S01010553 Nairn Rural	8	7	9	8	7	1	8	3821
S01011168 Raffor, Dallas, Dyke to Dava	7	7	9	8	8	4	9	3709

- 12.30 Table 12.3 shows that the proposed development is located in an area with low levels of deprivation. The area has good levels of healthcare and education in particular. Conversely both datasets highlight's the area's rural character as it scores poorly for the geographic access domain which is calculated using average drive and public transport travel times to various services and healthcare facilities.

Employment and Economic Development

- 12.31 Enterprising Highlands²⁰ recognises the Nairn sub-region has having a skilled and experienced workforce and good transport links with the rest of Scotland and the UK. Within the Highlands more widely, Enterprising Highlands²¹ notes that the energy sector has grown by 236% over the past eight years with a corresponding 17% increase in employment in this sector.

¹⁶ National Records of Scotland, (2020), 'Highland Council Area Profile', Available [online] at: <https://www.nrscotland.gov.uk/files//statistics/council-area-data-sheets/highland-council-profile.html>

¹⁷ The Highland Council, (2015), 'Inner Moray Firth Local Development Plan', Available [online] at: https://www.highland.gov.uk/downloads/file/15008/adopted_inner_moray_firth_local_development_plan

¹⁸ Highlands and Islands Enterprise, (2019), 'Inner Moray Firth Key statistics', Available [online] at: <https://www.hie.co.uk/media/6340/innerplusmorayplusfirthpluskeyplusstatisticsplus2019.pdf>

¹⁹ The Scottish Government, (2020), 'Scottish Index of Multiple Deprivation 2020', Available [online] at: <https://www.gov.scot/collections/scottish-index-of-multiple-deprivation-2020/>

²⁰ Enterprising Highlands, (2020), 'Regions', Available [online] at: <https://enterprisinghighland.com/invest/Regions>

²¹ Enterprising Highlands, (2020), 'Sectors', Available [online] at: <https://enterprisinghighland.com/invest/sectors>

- 12.32 The Office for National Statistics (ONS)²² provides the employment and unemployment rates across local council regions. Between January 2019 and December 2019, the employment rate for THC was 78.7% (118,000) compared to 74.8% for Scotland as a whole. Across the same period, 3,300 people within THC were unemployed, equating to 2.8% of THC’s economically active population. This was just lower than the same figures for Scotland (3.5%) and the UK (3.9%).
- 12.33 Table 12.4 shows that the highest proportion of the working population in THC were employed in ‘professional occupations’, with the lowest proportion of the working population were employed in the ‘Process Plant and Machine Operatives’ sector. These figures were lower than in Scotland as a whole.

Table 12.4: Employment by Occupation in Highlands (January 2019 - December 2019)²³

Occupation type	Highlands (%)	Scotland (%)
Managers, directors and senior officials	9.0	9.3
Professional occupations	20.2	21.2
Associate professional & technical	7.4	13.7
Administrative & secretarial	11.3	9.3
Skilled trades occupations	18.0	10.9
Caring, leisure and Other Service occupations	13.3	9.8
Sales and customer service	6.1	8.6
Process plant & machine operatives	5.6	6.1
Elementary occupations	8.7	10.8

- 12.34 A recent study²⁴ has estimated that THC could gain £360million from wind and hydro projects, which would be driven by expenditure across industries such as civil and electrical engineering, environmental and technical evaluation and monitoring, plant hire, fencing, hospitality services, and the creation of a new quarry and concrete plant. The majority of the economic contribution is expected during the operational phase of developments.
- 12.35 Onshore Wind: Economic Impacts in 2014 (RenewableUK, 2015) found that a typical UK wind farm will invest £2.97m per MW3 over its development, construction and operational stages. Of this, 69% (£2.06m per MW) of this total spend is retained within the UK economy. Of this, 48% is spent in the country in which a typical wind farm is located. This is worth £1.43m per MW to the region/nation. 27% (£0.81m) of overall spend is retained within the local authority area. The report goes on to note that, for or each 1MW of installed capacity, it would be reasonable to expect:

- 0.54 jobs and £40,631 GVA in the UK economy to be supported during the development stage;
- 2.49 jobs and £159,251 GVA in the UK economy to be supported during the construction stage; and
- 0.43 jobs and £22,347 GVA per year in the UK economy to be supported during a typical 25 year operational stage (noting that a 35 year operational lifespan is proposed for the proposed development).

Scotland’s Economic Strategy

- 12.36 Scotland’s Economic Strategy (SES)²⁵ sets out a strategic approach to delivering increasing sustainable growth. The strategy identifies the energy sector as one in which Scotland has significant strengths. The Scottish Government noted in the previous Government Economic Strategy that “with 25% of Europe’s wind potential and vast renewable resources, Scotland can become an international leader in this critical sector”. Energy (with a particular focus on renewables) was identified by the Scottish Government as one of Scotland’s key sectors with high-growth potential and with the capacity to boost Scotland’s economic productivity. The Scottish Government “will give particular attention to building a critical mass of activity in these sectors, with government helping to create the right environment for their competitiveness and growth”.

Highlands and Islands Enterprise 2019 - 2022 Strategy

- 12.37 The Highlands and Islands Enterprise is the economic and community development agency for the Highlands and Islands of Scotland and supports a broad range of sectors, organisations and communities. The Strategy²⁶ sets out the ambition to attract new major investments through the region and cites the “fresh and exciting” energy sector as key to achieving this. The Strategy recognises that the low carbon economy and renewables sector already contributes substantially to the region and creates many economic and social opportunities. Using its current international reputation of excellence in the energy and the low carbon sector, the strategy seeks to strengthen these through capitalising upon the UK and Scottish Governments’ commitments to move to a lower carbon, decentralised and locally based energy system. For onshore wind farms, the strategy aims to secure supply chain opportunities and promote a supportive energy policy and regulatory environment.

²² NOMIS Official Labour Market Statistics, (2019), ‘Labour Market Profile: Highland’, Available [online] at: <https://www.nomisweb.co.uk/reports/Imp/la/1946157421/report.aspx>

²³ % is a proportion of all persons in employment and for those of age 16+

²⁴ SSE Renewables, (2020), Generating Benefits in the Great Glen: SSE Renewables’ Socio-Economic Contribution, Available [online] at: <https://www.sse.com/media/kvjj4ohp/generating-benefits-in-the-great-glen-june-2020.pdf>

²⁵ Scottish Government, (2015), ‘Scotland’s Economic Strategy’, Available [online] at: <https://www.gov.scot/publications/scotlands-economic-strategy/>

²⁶ The Highlands and Islands Enterprise, (no date), ‘2019-2022 Strategy’, Available [online] at: <https://www.hie.co.uk/media/5006/strategyplusplanplus2019-2022-1.pdf>

Scottish Government Good Practice Principles for Shared Ownership and Community Benefit of Onshore Renewable Developments

12.38 Shared ownership and community benefit, whilst different, are interlinked and can be valuable to communities located within proximity to development projects²⁷. The two benefits can be summarised as follows:

- shared ownership involves agreeing a contract with a developer so that an investment is made and the community receives income from a wind farm; and
- community benefit can be a direct or indirect payment to the community, to support their local priorities.

12.39 The Scottish Government promotes both forms of community involvement in renewable energy schemes, and advocates flexibility in how this is applied. This may be related to provision of the recommended rate equivalent to £5,000 per MW, but may include a different rate or include scope for the direct funding of specific projects identified by the community. It is also recognised that community benefit in the wider sense, can address longer term community needs by generating positive social and economic impacts which provide a lasting and meaningful legacy.

Public Access, Recreation and Land Use

12.40 The proposed development is situated approximately 1.5km to the south east of the small settlement of Ferness and approximately 15km to the south east of Nairn, located within the Inner Moray Firth, which is part of The Highland Council area. The site is bounded to the west by the A939 and the B9007 to the north, while the eastern extent is parallel to the Local Authority boundary with Moray Council, which is physically marked by a post and wire fence. A 275kV overhead transmission lines mounted on steel tower traverses the northern part of the site to the west.

12.41 Land use within the site is managed at a fairly low level for grazing. Localised peat-cutting and burning historically occurred on the site, but this activity no longer takes place. Evidence of more substantial management is present in the form of systematic drainage channels which form part of the several minor watercourses located within the site. To the south of the site lies Lochan Tùtach which has previously been occasionally fished and stocked with rainbow trout, with brown trout also present²⁸.

12.42 In terms of public access, there are no Core Paths or Rights of Way located within the site boundary. The Core Paths located within 5km 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, northeast and southeast of the site.

²⁷ The Scottish Government, (2019), 'Scottish Government Good Practice Principles for Shared Ownership and Community Benefit of Onshore Renewable Developments', Available [online] at: <https://www.gov.scot/publications/scottish-government-good-practice-principles-community-benefits-onshore-renewable-energy-developments/>

12.43 In addition, there are various Core Paths in the wider study area, including around settlements such as Grantown-on-Spey, approximately 13.5km south of the site, and Nairn, approximately 15km northeast of the site.

12.44 Scotways has identified the following Rights of Way within 5km 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 5-6km east of the site;
- Heritage Paths, comprising the Dava Military Road (approximately 2km east of the site), the Dava Way (detailed above) and the Old Road to Forres (approximately 5km west of the site).

12.45 The Speyside Way long distance footpath passes through Grantown-on-Spey and lies approximately 14km southeast of the site at its closest point.

12.46 Sustrans National Cycle Route 1 lies approximately 10km northwest of the site at its closest point. The Dava Way is also promoted by the Sustrans National Cycle Network 1 as suitable for off-road cycling, as well as being used for equestrian purposes.

12.47 The A939 and A940 are promoted by Visit Scotland as a National Tourist Route, known as the 'Whisky Trail'.

12.48 The Cairngorms National Park boundary is located 8km to the south of the redline boundary.

12.49 All of the aforementioned tourism and recreational designated routes are shown on Figure 12.1. 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.

12.50 The fourth Moray Walking and Outdoor Festival was scheduled to take place in June 2020, although has been postponed due to the Covid-19 pandemic. A number of events are held along The Dava Way including the 'Ghost Train Walk', a midsummer overnight walk.

Tourism

12.51 Tourism makes an important contribution to the national, regional and local economies. In 2018²⁹, there were over 15.5 million overnight visitors to Scotland, including over 3.5 million visitors from overseas. This represented a spending of almost £5.1 billion.

12.52 Within the Highlands, there were approximately 1.69m visits to the Highland region in 2018 by British tourists and approximately 521,000 from overseas. Spend from British tourist was £425m and £195m from overseas tourists.

²⁸ <https://www.fnift.org.uk/wp-content/uploads/2012/01/Findhorn-Fisheries-Management-Plan-June-2010.pdf>

²⁹ The Scottish Tourism Alliance, (2020), 'Scotland Outlook 2030: Responsible Tourism for a Sustainable Future', Available [online] at: <https://scottishtourismalliance.co.uk/wp-content/uploads/2020/03/Scotland-Outlook-2030.pdf>

12.53 The top reasons for visiting Highlands between 2016-18 according to a VisitScotland survey³⁰, in which respondents were able to provide more than one response, were:

- to see the landscape and scenery (87%);
- always wanted to visit (58%);
- the history and culture (55%);
- to get away from it all (37%); and,
- holidayed in the Highlands before and wanted to return (36%).

12.54 The most popular activities were:

- sightseeing (81%),
- visiting a historic house (65%); and
- going for a short walk/stroll (59%).

12.55 The top five visitor attractions identified by VisitScotland for Highlands in 2018 were:

- Urquhart Castle (518,195 visitors);
- Glenfinnan Monument (385,352 visitors);
- Glenmore Forest Park (estimated 318,511 visitors);
- Loch Ness by Jacobite (311,613 visitors); and,
- Glencoe Visitor Centre (213,343 visitors).

12.56 The main visitor attractions within the 15km Study Area is Cairngorms National Park (approximately 8km to the south of the site), Cowdor Castle (approximately 14km north west of the site) and Brodie Castle (approximately 11km north of the site). Local (within 5km) tourist attractions within the vicinity of the proposed development are the ACE Adventures and Hideways (multi-activity centre), Logie Steading Visitor Centre (a shopping centre, a visitor centre and gardens) and Green Tree Arts Studio.

12.57 The 187km long Highland tourist Route connects Aberdeen to Inverness and passes along the site's west boundary on the A939.

12.58 At its closest point, Sustrans National Cycle Network Route 1 lies approximately 14.5km to the north east of the site.

12.59 There are a number of self-catering accommodation provisions at the settlements of Redburn (approximately 3.8km north west of the site) and Relugus (approximately 3.5km north east of the site).

Scotland's Tourism Strategy

12.60 Scotland's tourism strategy sets out how Scotland plans to generate an additional £1 billion of visitor spending by 2020, by focusing on four areas of growth:

- nature, heritage and activities;

- business tourism;
- destination towns and cities; and
- events and festivals.

12.61 The Scottish Tourism Alliance (STA) sets out how Scotland can benefit from and harness the beauty of its dramatic landscapes and the vibrancy of its culture and history. Scotland's countryside can provide an appropriate setting for holidays, with a range of things to see and do, such as walking, playing golf, visiting castles and taking part in adventure sports.

12.62 It emphasises that to capitalise on these assets and grow their value, local communities need to communicate and collaborate to develop quality networks. This will allow the community to turn diverse local assets into authentic experiences. As noted above, this has been evident within the businesses operating within the Study Area.

12.63 The Mid Term Review of the strategy states that since 2012, there has generally been growth in visitor spend from many of Scotland's main markets and a general increase in turnover and jobs supported.

12.64 Neither the original strategy, nor the review, consider that renewable energy projects are a barrier to growth.

Scotland Outlook 2030

12.65 This document³¹ is the continuation of Scotland's Tourism Strategy and sets a vision for Scotland to "be the leader in 21st century tourism". It seeks to ensure that tourism can and will benefit every person who lives in Scotland, visits Scotland and works in Scotland.

12.66 To achieve this, four key priorities are identified:

- Our passionate people - attracting, developing and retaining a skilled, committed, diverse and valued workforce;
- Our thriving places - creating and developing a sustainable destination together;
- Our memorable experiences - providing the very best, authentic and memorable experiences; and,
- Our diverse businesses - building business resilience, sustainability and profitability.

12.67 In addition, the outlook has identified six conditions for success; digital, policy, investment, connectivity, business network and positioning.

12.68 The document recognises that the global tourism industry has changed, from the way tourists travel, to how they share their experiences through digital relationships and connections, what they look for is now more experienced based. It also recognises that Scotland's transition to net zero gas emissions has gained global respect which sits well with the rise in travellers making decisions based on conscience and sustainable tourism.

³⁰ Visit Scotland, (2017), 'Scotland Visitor Survey 2015 and 2016, Available [online] at: <https://www.visitscotland.org/binaries/content/assets/dot-org/pdf/research-papers/scotland-visitor-survey-the-highlands-2016.pdf>

³¹ The Scottish Tourism Alliance, (2020), 'Scotland Outlook 2030: Responsible Tourism for a Sustainable Future', Available [online] at: <https://scottishtourismalliance.co.uk/wp-content/uploads/2020/03/Scotland-Outlook-2030.pdf>

Studies into Public Attitudes to Wind Farms

Amenity of Local Residents

- 12.69 Potential effects on the amenity of local residents are considered to include changes to views, potential noise disturbance and effects as a result of increased traffic and heavy goods vehicles on nearby routes. There are often preconceptions about wind farms and how they will affect the amenity of local residents and the surrounding area. As a result, a number of surveys and studies have been undertaken to investigate the attitudes of the public to wind farms, including those focused on people who live in close proximity to wind farms and those focused on tourists and visitors to areas where wind farms are present.
- 12.70 A study carried out by Harris Interactive during April 2014 on behalf of The Guardian³² found that wind energy is the most welcome form of power source according to a survey of more than 2,000 people from across differing incomes and political allegiances. Almost half (48%) of respondents claimed that a wind farm would be welcome within 8km of their home. By contrast only 20% could say the same for new coal fired power stations, and only 27% were open to new nuclear power stations. Fracking received the least support with only 19% of those surveyed in support for this technology.
- 12.71 A survey undertaken by YouGov on behalf of Renewable UK in June 2018 found that, of a sample size of 3,609 of British adults, more people (23%) would prefer a wind farm in their local area than other types of infrastructure, such as a fracking site, a new railway line, a new housing development of 150 homes or a nuclear power station. The survey also found that 69% of respondents support the building of more onshore wind farms as it reduces our dependency on fossil fuels (72% of supporters) and will have positive impacts on climate change/meeting carbon reduction targets (53% of supporters).
- 12.72 In addition, as found by the latest wave (29) of BEIS's Public Attitudes Tracker (2019), 79% of people said they support the development of onshore wind. In addition, 82% of respondents expressed support for renewables in general. 61% of respondents would support the development of a large-scale renewable energy development in their area and 80% believe that developments should provide direct benefit to the communities in which they are located.

Amenity of Tourists

- 12.73 A Renewable UK Report entitled 'Onshore Wind: Direct and Wider Economic Impacts' (2012) suggested that wind farms can have a beneficial effect on tourism as a result of increased funding for improvements to tourism infrastructure and attractions. This beneficial effect is corroborated by Aitchison who concludes that any negative effect is offset by the number of tourists who will visit irrespective of the presence of a wind farm, or of factors related to the wind farm itself.

- 12.74 The YouGov poll, commissioned by Scottish Renewables in 2013, indicated that 69% of respondents would not base their decision to visit an area of Scotland on the presence of a wind farm. However it has also been found that wind farms may act as tourist attractions in their own right, with 120,000 people visiting the visitor centre at Whitelee Wind farm in the 12 months after its opening in 2009.
- 12.75 Most recently Biggar Economics published a research report 'Wind Farms and Tourism Trends in Scotland' (July 2016), which highlighted Argyll and Bute as having the highest concentration of sustainable tourism workers, and therefore the greatest reliance on this sector, in Scotland. The sustainable tourism sector accounts for 18.3% of employment in Argyll and Bute.
- 12.76 This study shows that at local authority level, the development of onshore wind farms does not have a detrimental effect on the tourism sector, and included analysis of the localities where onshore wind farms had been developed (within 15km of onshore wind developments). The analysis considered 18 wind farms constructed between 2009 and 2013, and utilised tourism employment data from the Office of National Statistics, before and after the wind farm was developed. This found that in the majority of cases (66%) sustainable tourism employment performed better in areas surrounding wind farms than in the wider local authority area. There was no emerging pattern which would suggest that onshore wind farm development has had a detrimental effect on the tourism sector, even at a local level.
- 12.77 This study concludes that there is no relationship between the development of onshore wind farms and tourism employment at national or local authority level, nor in areas immediately surrounding wind farm developments.
- 12.78 These studies highlight the varying opinions with regards to wind energy development; however, they suggest in all cases that the majority of those surveyed, whether residents or tourists, do not have a negative perception of wind farms.

Future Baseline

- 12.79 If the proposed development was not to proceed, there will be little or no change to the baseline condition of the various tourism assets identified within the local area. Local communities will still receive direct economic benefits in terms of a flexible community benefit package and direct and indirect employment benefits from the construction and operation of other wind farms in the area. This will, however, not be to the same extent if the proposed development is not constructed. Absence of the proposed development will, however, remove the opportunity for the proposed development to provide local jobs, which in turn may prevent local economic growth and development, particularly under an expected term of economic recession as Scotland recovers from the Covid-19 pandemic. To put this into context, the Scottish Government has estimated that unemployment in Scotland could reach 10% by the end of 2020³³.

³² The Guardian, (2014), 'Wind Power Most Popular Source of Energy in UK', Available [online] at: <http://www.theguardian.com/big-energy-debate/wind-power-popular-energy-source-uk>

³³ Scottish Government, 2020, Towards a Robust, Resilient Wellbeing Economy for Scotland

Implications of Climate Change

- 12.80 The 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) an increase in temperature and longer summers affect the tourism and recreation sector, in particular by accentuating the existing seasonal nature of outdoor recreational activities and associated visitor accommodation bookings in the summer months.

Cairn Duhie Wind Farm Design Considerations

- 12.81 No specific design changes have been made to the layout of the proposed development in relation to socio-economics, recreation or tourism. However, as detailed in Chapter 3: Design Evolution and Alternatives, a number of the specific site design principles relate to the surrounding landscape and minimises effects on landscape and visual amenity, including from nearby settlements, viewpoints and surrounding areas of importance for recreation and tourism.

Micrositing

- 12.1 Any micrositing of infrastructure within the proposed 50 m allowance will not alter the findings of the socio-economic assessment.

Likely Significant Effects

- 12.2 The assessment of effects is based upon the description provided in Chapter 4: Development Description and is structured as follows:
- construction effects;
 - operational effects; and
 - cumulative effects of the proposed development and other wind farm proposals within 40km during construction and operation.

Embedded Mitigation Measures

- 12.3 No specific mitigation measures have been embedded to address the potential for socio-economic effects, however the design has taken account of effects on the visual amenity at key viewpoints which are of relevance for recreation and tourism.

Construction Effects

Predicted Construction Effects

Direct employment and economic benefits

- 12.4 Scotland and the UK capture the majority of the economic value generated by wind farms which are built here. On average, 66% of the total economic value of a wind farm accrues to the UK; 51% of which is in Scotland. Local areas also benefit, with on average 16.5% of the total value accruing to the local region³⁴. Benefits include local employment and service contracts during project operations, direct payments to local economies via land rents, indirect income through business rates and spend on travel, accommodation and supplies, as well as flexible community benefit packages.
- 12.5 The current construction cost forecast is likely to be £54.1m, with a number of people employed during the 15 month long construction phase, with the total number of personnel onsite at any one time varying throughout the programme depending on the tasks being undertaken at any one time.
- 12.6 At the 11 turbine Glenchamber Wind Farm (another project by the Applicant in Dumfries and Galloway) 45 local people were employed throughout construction, resulting in the upskilling of local businesses and workforce. At the 11 turbine Freasdail Wind Farm in Argyll and Bute, 85 people were employed at the height of construction.
- 12.7 Wherever reasonably practicable, the Applicant is committed to using local contractors, suppliers and employees during the construction phase of the proposed development. At the time of writing, local businesses who may be able to offer skills and services during the construction of the proposed development are being invited to contact the Applicant.
- 12.8 Adopting a conservative approach which does not consider how the future economic baseline may change as a result of Covid-19 recovery (i.e. major job loss and economic decline), it is considered that construction will have an effect of **minor (positive) significance** on the local economy and employment in The Highland Council area.

Indirect Employment and Economic Benefits

- 12.9 It is likely that there will be some local employment generated indirectly as a result of the construction of the proposed development. This could include supply chain spin-offs for local businesses and sub-contracted work relating to the transportation of construction workers and materials. Any construction workers not living locally may choose to reside in local accommodation which will further benefit the local economy through spending in local hotels, B&Bs, shops and restaurants.
- 12.10 The local of supply chain spin-offs and sub-contractor work will depend upon local capacity. In terms of local skills, it is considered feasible that during the construction process there will

³⁴ BVG Associates, (2017), 'Economic benefits from onshore wind farms', Available [online] at: <https://bvgassociates.com/wp-content/uploads/2017/09/BVGA-18510-Economic-impact-onshore-wind-report-r3.pdf>

be opportunities for 'up-skilling' of local people either directly or indirectly employed in relation to the proposed development. Those employed may develop skills that will be of benefit to the local economy in the longer term, such as project management and/or construction skills which are transferrable to other renewable energy developments.

- 12.11 The estimated development and construction cost of the proposed development is expected to be approximately £67.2m based on an estimated capital expenditure of £1m per installed MW. Based on economic research for the onshore wind energy industry³⁵, it is anticipated that this value would be divided approximately as follows: development and planning costs (10%), balance of plant (26%), turbines (58%) and grid connection costs (6%). It is anticipated that up to 10% of the overall value of contracts could be realised in Highlands (up to £6.72m).
- 12.12 Adopting a conservative approach which does not consider how the future economic baseline may change as a result of Covid-19 recovery (i.e. major job loss and economic decline), the effect of the creation of additional indirect employment is considered to be of **minor positive significance** for the local economy.
- 12.13 An example of expenditure at another RES project, Freasdail Wind Farm in Argyll and Bute, resulted in total sum of local expenditure of £6.35 million once the wind farm was energised in early 2017, including the following:
- local contractors: £4.21 million;
 - local materials: £1.56 million;
 - supplies/services: £0.36 million; and
 - local accommodation: £0.21 million.

Public Access and Recreation

- 12.14 The site of the proposed development is not currently used for any formal public recreation activities and there are no known Rights of Way, core paths or wider network paths which cross it. Core paths and wider network paths which have been identified in the Existing Conditions section will not be directly affected during construction.
- 12.15 It is not anticipated that the increase in noise and traffic during construction, or the generation of dust from construction activities will have a significant effect on recreational users. It is therefore considered that traffic, dust and noise effects will have a negligible effect on public use of the Dava Way, core paths and wider network paths located within the vicinity of the proposed development.
- 12.16 Public access throughout the construction phase will be restricted and managed by the appointed Contractor for health and safety reasons in line with requirements of the Construction (Design and Management) (CDM) Regulations 2015. This will restrict people from accessing the site.
- 12.17 Given the scope for informal recreation in the surrounding area, and the informal nature of recreational activity, it is not anticipated that the proposed development will directly affect

public access or recreational activity during construction, and therefore, a temporary direct effect of **negligible significance** is anticipated.

Land use

- 12.18 During construction there will be some disruption to the main activities onsite, i.e. grazing is likely to be temporarily disrupted. As such, it is considered that construction of the proposed development will have an effect of **minor negative significance** on land use of the site for a limited period of time.

Tourism

- 12.19 It is possible that the construction of the proposed development could lead to a decrease in the availability of tourist accommodation within the area surrounding the site, as construction workers from outside the area will require accommodation for the duration of the construction phase. However, it is considered that any reduction in accommodation will be compensated for by revenue generated by the (non-seasonal) accommodation of site workers.
- 12.20 It is not considered that construction of the proposed development, particularly construction traffic, will discourage tourists from visiting the local area.
- 12.21 The effect of construction of the proposed development on tourism will be **negligible**.

Proposed Mitigation

- 12.22 No mitigation is required, as no significant adverse residual effects are predicted.

Residual Construction Effects

- 12.23 The predicted residual effects during construction of the proposed development will remain as set out above.

Operational Effects

Predicted Operational Effects

Direct employment and economic benefits

- 12.24 Due to their remote operational control and limited need for servicing, wind farms do not create large numbers of jobs during the operational stage. of the number of FTE staff will employed to operate the wind farm and undertake routine maintenance work during the lifetime of the wind farm (35 years) will be minimal.
- 12.25 This is considered to be a **negligible** effect for the local economy.

Indirect Employment and Economic Benefits

- 12.26 An increased level of employment is likely to be generated from operation of the proposed development, with some associated indirect employment and economic benefits. Using the figures noted above from the Renewable UK study Onshore Wind: Economic Impacts in 2014

³⁵ BIGGAR Economics, (2015), 'Onshore Wind: Economic Impacts in 2014', Renewable UK.

it can be assumed that for each MW of installed capacity will support 0.43 jobs and £22,347 GVA per year in the UK economy during a typical wind farm 25 year operational period (noting that a 35 year lifespan is proposed for the proposed development). This would result in over £1.5million generated each year, which would be a minor positive effect.

- 12.27 The potential total direct, indirect job creation from the operation of the proposed development over its 35 year lifespan is considered to be **negligible** for the local economy.
- 12.28 Similarly, the effect of the creation of additional indirect FTEs and indirect economic benefits is **negligible** for the local economy.

Public Access and Recreation

- 12.29 The operational wind farm will have 8.3km of additional access track, however as stated in Chapter 4: Development Description, these will be used to permit operational and maintenance services. As there are no Core Paths or Rights of Way located within the site boundary a **negligible** effect is identified for public access and recreation.

Land use

- 12.30 Once operational, the wind farm will provide a form of rural diversification in the area through income generated from the turbines. Furthermore, once the wind farm is operational, grazing and peat cutting can continue as outlined in Appendix 7.4 Outline Habitat Management Plan. On this basis, it is considered that operation of the wind farm will have an effect of **minor positive significance** on the land use of the site.

Tourism

- 12.31 The operation of the proposed development will not prevent people from visiting the area around the site. In addition, none of the top tourist attractions in the Nairn, or those within the region or more locally are likely to be adversely affected in terms of reduced visitor numbers as a result of the operation of the proposed development. As such, it is considered that the operational effects on tourism will be **negligible**.

Proposed Mitigation

- 12.32 No mitigation is required, as no significant adverse residual effects are predicted.

Residual Operational Effects

- 12.33 The predicted residual effects during operational phase of the proposed development will remain as set out above.

Cumulative Effects

Predicted Cumulative Construction Effects

Direct Employment and Economic Benefits

- 12.34 Should all of the schemes identified within 40km (as shown on Figure 5.1.6) be constructed, the cumulative effect on direct employment and economic benefits will be positive for both The Highlands Council and wider economy. It is beyond the scope of this chapter to calculate the likely direct employment and economic benefits of other surrounding schemes, particularly as there are no schemes within a 5km radius of the site. However if those which are yet to be determined are consented, the nearby schemes (within 10km of the site) of Hill of Glaschyle (operational), Clash Gour (under appeal), Ourack (at scoping), Berry Burn (operational), will create employment opportunities, and a **minor positive** effect is identified.

Indirect Employment and Economic Benefits

- 12.35 It is likely that there will be some local employment generated indirectly as a result of the construction of proposed development. This could include supply chain spin-offs for local businesses and sub-contracted work relating to the transportation of construction workers and materials. The local supply chain spin-offs and sub-contractor work will depend upon local capacity. In terms of local skills, it is considered feasible that during the construction process there will be opportunities for 'up-skilling' of local people either directly or indirectly employed in relation to the proposed development. Those employed may develop skills that will be of benefit to the local economy in the longer term, such as project management and/or construction skills which are transferrable to other potential renewable energy developments. A **minor positive effect** is likely in relation to Indirect employment and economic Benefits.

Public Access and Recreation

- 12.36 It is predicted that there may be some positive cumulative effects on public access and recreation in the wider area through the provision of new paths and access routes available to walkers and cyclists. This will make access easier for a proportion of people (and the site is not considered to be within an area where higher levels of recreational activity would be of concern). Adopting a conservative approach, the contribution of the wind farm to this positive effect is considered to be **negligible**.

Tourism

- 12.37 It is possible that the construction of the proposed development simultaneously with other schemes nearby could lead to a greater decrease in the availability of tourist accommodation within the area surrounding the site, particularly as there are limited accommodation opportunities within the local area. However, as there are no proposed wind farms within 5km of the site and it is unlikely that all of these workers would be working on the site at one time, a **negligible** effect is identified.

Proposed Mitigation

12.38 No mitigation is required, as no significant adverse residual effects are predicted.

Residual Cumulative Construction Effects

12.39 The predicted residual effects for the cumulative effects arising during the construction of the proposed development will remain as set out in the section above.

Predicted Cumulative Operational Effects*Direct Employment and Economic Benefits*

12.40 Due to their remote operational control and limited need for servicing, wind farms do not create large numbers of jobs during the operational stage. Displacement is not considered likely during the operational phase. A **minor positive effect** is likely in relation to direct employment generation.

Indirect Employment and Economic Benefits

12.41 As for the proposed development on its own, it is likely that there will be some local employment generated as an indirect result of the operation of the three schemes, and this will be associated with induced employment effects resulting from increased household expenditure among those individuals who have gained employment both directly and indirectly as a result of operation of the proposed development. A **minor positive effect** is likely in relation to Indirect employment and economic Benefits.

Public Access and Recreation

12.42 It is predicted that there may be some positive cumulative effects on public access and recreation in the wider area through the provision of new paths and access routes available to walkers and cyclists. This will make access easier for a proportion of people (and the site is not considered to be within an area where higher levels of recreational activity would be of concern). Adopting a conservative approach, the contribution of the wind farm to this positive effect is considered to be **negligible**.

Tourism

12.43 Considerable research has been undertaken relating to the potential effects of wind farms on tourism and there is no evidence that wind farms have a negative effect on tourist numbers. For example, the VisitScotland survey referred to above (2011) revealed that the majority of people had seen a wind farm whilst on a holiday in the UK (Scotland) and indicated, on the most part (80% of UK respondents and 83% of Scottish respondents), that the presence of a wind farm would not affect their decision about where to visit or stay in the UK.

12.44 Cumulative effects on tourism, as a result of construction of all the potential wind farm projects within 40km, are therefore considered to be **negligible**.

Proposed Mitigation

12.45 No mitigation is required, as no significant adverse residual effects are predicted.

Residual Cumulative Operational Effects

12.46 The predicted residual effects for the cumulative effects during operational phase of the proposed development will remain as set out in the section above.

Interrelationship between Effects

12.47 The potential effects of the wind farm are considered above in terms of effects on socio-economics, recreation and tourism. As mentioned previously, there is a correlation between recreation and tourism effects and views of the wind farm from viewpoints within the wider 40km landscape and visual study area. Whilst the assessment of such interrelated effects is presented within this chapter, the assessment necessarily relates to the assessment in Chapter 5: Landscape and Visual Impact Assessment. There is also some correlation between potential effects on recreational amenity resulting from dust and noise effects during construction. Effects on noise are considered in Chapter 11: Noise and effects on dust are included in Chapter 13: Other Issues.

Summary

12.48 Table 12.5 below summarises the predicted effects of proposed development in relation to socio-economics, tourism and recreation. No significant effects were identified.

Table 12.5: Summary of Residual Effects

Likely Effect	Mitigation	Means of Implementation	Residual Effect
Construction			
Direct employment and economic benefits – minor positive effect	Not applicable	Not applicable	Minor positive effect
Indirect Employment and Economic Benefits - minor positive effect	Not applicable	Not applicable	Minor positive effect
Public Access and Recreation – negligible effect	Not applicable	Not applicable	Negligible effect
Land use – minor negative effect	Not applicable	Not applicable	Minor negative effect
Tourism - negligible effect	Not applicable	Not applicable	Negligible effect
Operation			
Direct employment and economic benefits – negligible effect	Not applicable	Not applicable	Negligible effect

Likely Effect	Mitigation	Means of Implementation	Residual Effect
Indirect Employment and Economic Benefits - minor positive effect	Not applicable	Not applicable	Minor positive effect
Public Access and Recreation - negligible effect	Not applicable	Not applicable	Negligible effect
Land use - minor positive effect	Not applicable	Not applicable	Minor positive effect
Tourism – negligible effect	Not applicable	Not applicable	Negligible effect
Cumulative - construction			
Direct Employment and economic Benefits – minor positive effect	Not applicable	Not applicable	Minor positive effect
Indirect Employment and Economic Benefits – minor positive effect	Not applicable	Not applicable	Minor positive effect
Public Access and Recreation – negligible effect	Not applicable	Not applicable	Negligible effect
Tourism – negligible effect	Not applicable	Not applicable	Negligible effect
Cumulative - operation			
Direct Employment and economic Benefits – minor positive effect	Not applicable	Not applicable	Minor positive effect
Indirect and Induced Employment and Economic Benefits – minor positive effect	Not applicable	Not applicable	Minor positive effect
Public Access and Recreation – negligible effect	Not applicable	Not applicable	Negligible effect
Tourism – negligible effect	Not applicable	Not applicable	Negligible effect

Chapter 13: Other Issues

13. Other Issues

Introduction

13.1 This chapter assesses the potential effects of the proposed development in relation to:

- Climate change mitigation (including carbon balance) and adaptation;
- Major accidents and disasters; and
- Aviation and air safeguarding.

13.2 This assessment has been undertaken by RES (aviation and carbon balance) and LUC (climate change and major accidents and disasters). LUC also prepared the information in relation to human health which has been scoped out of detailed assessment.

13.3 A number of additional potential effects have been scoped out of the assessment, including shadow flicker, dust, television, telecommunications and human health as explained below.

13.4 The Aviation and air safeguarding assessment was overseen by Sam Johnston of RES. Sam holds the role of Aviation Manager, with an MMath in Mathematics. Sam has over 20 years' experience in the aviation radar industry with over 13 of those years specifically in the area of wind farms. Sam is a member of the Renewable UK Aviation Working Group. and is Vice Chair of Aviation Investment Fund Company Limited (AIFCL).

13.5 The climate change and major accidents and disasters assessment was overseen by Joanna Wright at LUC. Joanna is a Director of Environmental Planning, with an MA in Geography, an MSc in Environmental Impact Assessment and an MSc in Carbon Management. Joanna has over 25 years' experience in the management and co-ordination of EIAs for onshore wind farms in Scotland, and is a Full Member of the Institute of Environmental Management and Assessment (IEMA) and a Chartered Environmentalist.

13.6 This chapter is accompanied by Appendix 13.1: Major Accidents and Disasters Screening Checklist.

13.7 The assessment of effects is based on the proposed layout as detailed in **Chapter 4: Development Description**.

13.8 The impacts of climate change are widely recognised as being one of the greatest global economic, environmental and social challenges facing the world today. A major cause of climate change is a rise in the concentration and volume of greenhouse gases in the atmosphere, a significant contributor to which, is the use of fossil fuels to generate electricity. The purpose of the proposed development is to generate electricity from a renewable source of energy, offsetting the need for electrical generation from the combustion of fossil fuels. Consequently, the electricity that will be produced by the proposed development will result in a saving in emissions of carbon dioxide (CO₂) with associated environmental benefit. The climate change assessment therefore draws largely on this premise.

13.9 It is important to note that the consideration of human health effects does not provide detailed coverage of those aspects already covered in health and safety and related legislation, particularly relating to measures required to protect workers during construction of the proposed development. As noted above, a detailed assessment of potential effects on human health has not been undertaken, as such this topic is given only brief treatment below, where justification is provided to support the decision to scope it out of full assessment.

13.10 It should also be noted that there is an inherent link between the effects of major accidents and disasters on local populations and effects on human health given that the occurrence of major accidents or disasters may result in the loss of life or permanent injury. Thus, the risk of a major accident or disaster could also be considered to be a health effect, although is only considered in isolation within this assessment.

13.11 The assessment of potential effects on aviation and aviation safeguarding considers technical acceptability, based on air navigation safety, rather than following a strict EIA process of assessing the significance of effects. Such effects often require the implementation of technical mitigation solutions to ensure continued safe operation in the presence of a wind farm. The assessment of effects on these receptors is therefore one of technical analysis and consultation and seeks to identify whether the effect is likely to be 'acceptable' or 'not acceptable' to air navigation services provision.

Legislation and Policy

13.12 An overview of key relevant legislation and policy with respect to climate change has been undertaken and is summarised below.

Climate Change Bill (2019)

13.13 The Climate Change Bill, passed in September 2019, updates Scotland's framework of statutory emission reduction targets by increasing the ambition enshrined in the Climate Change (Scotland) Act 2009. The provisions of the Bill are based upon the advice received by the Scottish Government from the Committee on Climate Change (CCC).

13.14 The key provision in the Bill is a more ambitious emission reduction target for 2045. Advice from the CCC is that a 90% reduction in greenhouse gas emissions by 2050 would be more consistent with limiting temperature rise to 1.5°C than the current 80% target. The Scottish Government has therefore proposed to increase the ambition of the 2045 target to achieve net-zero emissions from all greenhouse gases by 2045, recognising the social, environmental and economic benefits that this will deliver.

Scottish Climate Change Plan (2018)

13.15 The Scottish Government published its updated Climate Change Plan (CCP) in February 2018. The plan sets out how Scotland can deliver its climate change target of 66% emissions reductions, relative to the baseline, for the period 2018-2032. The Plan includes emissions reduction trajectories for a range of sectors, in addition to indicators for monitoring progress.

- 13.16 The CCP confirms the Scottish Government support for the COP21 Paris Agreement, which sets the standard for the international response to climate change. In terms of the electricity sector, the CCP states that:
- By 2032, Scotland's electricity system will supply a growing share of Scotland's energy needs and by 2030, 50% of all Scotland's energy needs will come from renewables.
 - By 2032, Scotland's electricity system will be largely decarbonised and be increasingly important as a power source for heat and transport.
 - Electricity will be increasingly important as a power source for heat and in transport to charge Scotland's growing fleet of ultra-low emission vehicles.
- 13.17 Following the passing of the Climate Change Bill, the current Climate Change Plan was set to be revised in line with the net-zero target set out in the Bill which was due to be published in April 2020. However due to the COVID-19 pandemic, publishing an updated Plan has been paused¹.
- Scottish Energy Strategy (2017)**
- 13.18 This document sets a target of complete decarbonisation of energy and sets a new 2030 'all energy' target for the equivalent of 50% of Scotland's heat, transport and electricity consumption to be supplied from renewable sources, with Scotland a world leader in renewable and low carbon technologies and services.
- The National Planning Framework 3 (2014)**
- 13.19 National Planning Framework 3 ('NPF3') serves as the long-term planning strategy for Scotland. The NPF3 recognises that to ensure that Scotland is a sustainable place and a leader in low carbon energy generation, renewable energy will continue to make a significant contribution to the diversification of energy supplies².
- Highland-wide Local Development Plan (2012)**
- 13.20 Policy 37: Renewable Energy Developments of the Highland-wide Local Development Plan (HwLDP) states that during the decision process, THC will consider the contribution of the proposed development towards meeting renewable energy generation targets.
- Highland Renewable Energy Strategy (2006)**
- 13.21 The Highland Renewable Energy Strategy was approved as supplementary planning policy in support of the Development Plan in May 2006. It identifies the capacity in the Highlands for a range of renewable energy targets and although from August 2016 this document is no longer a material consideration, the generation targets were carried forward for monitoring purposes.
- 13.22 By 2020, 4,000MW of installed capacity was anticipated and by 2050 the document envisaged 13,000MW could be installed.

Scope of Assessment

Effects Assessed in Full

- 13.23 The following effects have been assessed in full:

Climate Change Mitigation and Adaptation

- Direct Carbon Dioxide (CO₂) and Nitrogen Oxide (NO_x) emissions during construction.
- Other carbon losses in the materials and systems which form temporary and permanent structures, arising as a result of the extraction and manufacture of materials, fabrication, transport to site, waste and the future demolition and potential for re-use.
- The contribution that the proposed development will have to offsetting CO₂ emissions once operational (positive contribution).
- The ability of receptors, such as species and habitats to adapt to climate change (climate adaptation) during operation of the proposed development, and the resilience of the proposed development to climate change, i.e. through consideration of mitigation or design.

Major Accidents and Disasters

- 13.24 A proportionate approach has been adopted for this assessment given that many events which could be classified as 'major accidents and disasters', and which could cause significant effects on the environment, are not relevant to the location of the proposed development. As such, any effects identified in the EIA Report which could have secondary effects in relation to major accidents and disasters, but which are not considered to be significant, are not assessed in this chapter.
- 13.25 The effects assessed are therefore limited to the potential for mechanical/structural malfunctions or storms which could result in turbine failure and serious injury or loss of life once the proposed development is operational. It is important to note that since the submission of the Cairn Duhie EIA Scoping Report in February 2020, IEMA has published 'Major Accidents and Disasters in EIA: A Primer'. This chapter therefore reflects the suggested methodology in this document.

Aviation and Air Safeguarding

- 13.26 The assessment identifies and considers the potential effects that the proposed development may have on civilian and military aviation and air safeguarding and, if required, the mitigation measures proposed to prevent, reduce or offset any potential adverse effects where possible. In relation to civil aviation assets it considers potential impacts on the Primary Surveillance Radar at Inverness Airport and the Air Traffic Control Surveillance Minimum Altitude Chart (ATCSMAC) and the potential mitigation measures identified to address these.

¹ Scottish Government (2020) Climate Change Plan update. Available [online] at: <https://www.gov.scot/news/climate-change-plan-update/>

² Work has begun on National Planning Framework 4 (NPF4) and the Government has published its Interim Position Statement in November 2020. The draft version of NPF4 is expected to be laid before the Scottish Parliament autumn 2021 with the final version being adopted in spring/summer 2022.

- 13.27 The potential impacts upon military aviation and radar are also considered. In relation to military aviation and radar, potential impacts on the Primary Surveillance Radar at RAF Lossiemouth are considered.
- 13.28 The assessment is based on an evaluation of existing data sources and desk studies, and consultation with key stakeholders.
- 13.29 The effects of wind turbines on aviation interests are well known but the primary concern is one of safety. The two principle scenarios that can lead to effects on the operations of aviation stakeholders are:
- physical obstruction: wind turbines can present a physical obstruction at or close to an aerodrome or in the military low flying environment, which itself presents a health and safety risk or otherwise requires changes to flight routes in the area which brings about other operational effects; and
 - radar/air traffic services (ATS): wind turbine clutter appearing on a radar display can affect the safe provision of ATS as it can mask unidentified aircraft from the air traffic controller and/or prevent them from accurately identifying aircraft under control. In some cases, radar reflections from wind turbines can affect the performance of the radar system itself.
- 13.30 In this context the scope of the assessment is to consider the impact of the proposed development on aviation stakeholders, including airports and other airfields, radar systems and air space users. This assessment also considers civil and military stakeholder aviation obstruction lighting requirements.
- 13.31 As standard, the Ministry of Defence and the Defence Geographic Centre (AIS Information Centre) will be provided with the following information for incorporation on to aeronautical charts and documentation:
- the date of commencement of the proposed development;
 - the exact position of the wind turbine towers in latitude and longitude;
 - a description of all structures over 300 feet high;
 - the maximum extension height of all construction equipment;
 - the height above ground level of the tallest structure; and
 - details of a visible and infrared aviation lighting scheme.

Effects Scoped Out

- 13.32 Effects within topics have been scoped out as follows:

Climate Change Mitigation and Adaptation

- Direct CO₂ and NO_x emissions from vehicles during operation as movements associated with turbine maintenance are considered to be minimal.

- The ability of receptors to adapt to climate change during construction of the proposed development as these effects are assessed long term, i.e. over the 35-year operational period.
- The cumulative ability of receptors to adapt to climate change during operation of the proposed development as this is largely a project specific consideration, namely the resilience of the project in question to climate change and the extent to which projected climate change could alter the predicted effect judgements.
- Indirect emissions arising from the demand for energy produced using fossil fuels (e.g. electricity for heating, cooling and lighting).

Major Accidents and Disasters

- Major accident and disaster types not considered to be a potential risk for the location of the proposed development, i.e. earthquakes, volcanic activity, wildfires, disease epidemics and technological or man-made hazards, such as industrial accidents and displaced populations (note Appendix 9.2 states there is no evidence of commercial mining or quarrying within the site boundary or immediate surrounds);
- Effects associated with peat slide risk during construction. The results of the peat slide hazard and risk assessment (see Appendix 9.2) indicate that there is a low to very low risk of peat instability across the site;
- Highly likely but low consequence events as they will not result in a significant environmental effect, such as heavy rainfall as good practice infrastructure design will ensure that onsite flooding will be minimised;
- Low likelihood and low consequence events such as minor spills as these events are not considered to result in significant environmental effects and do not fall into the category of major accidents and disasters; and
- Any hazards for which there is no credible source-pathway-receptor linkage.

Aviation and Air Safeguarding during Construction and Decommissioning

- 13.33 □ Interference with surveillance systems and radar can only occur once wind turbines are operational therefore potential effects during construction are not assessed.
- 13.34 Upon decommissioning, The Ministry of Defence and the Defence Geographic Centre (AIS Information Centre) will be informed of the removal of turbines. Following this, no decommissioning effects are expected and are not considered further.

Human Health

- 13.35 A detailed assessment of potential effects associated with human health has not been undertaken for the reasons outlined below:
- Health effects that could be a result of construction and operational noise, construction dust emissions, shadow flicker and construction traffic accidents are scoped out as these effects themselves are either scoped out (see below) or are not considered to be

significant as primary effects, which limits the likelihood that any related adverse effects on health would occur.

- Health effects as a result of deterioration of water quantity and quality of public and private water supplies are scoped out as no construction will take place within 250m of any abstractions. Furthermore, **Chapter 9: Hydrology, Hydrogeology, Geology and Peat** identifies that during the operational phase, the combination of layout design and site drainage design measures and an operational pollution prevention, water quality monitoring and emergency response plan will not lead to any significant effects on private water supplies.
- Health effects associated with improved access to recreational routes during operation of the proposed development are scoped out as increased use of the site is expected to be limited (there are also no Core Paths or Rights of Way located within the site boundary).

Television and Telecommunications

13.36 Effects on television and telecommunications have been scoped out of detailed assessment for the following reasons:

- Operational effects on television: digital television is less likely to be affected by the atmospheric conditions that rendered analogue television unwatchable and does not suffer from reflection effects or ghosted image generation. It is anticipated that an appropriate condition will be attached to any consent and will require the Applicant to provide mitigation in the unlikely event that effects on television reception occur as a consequence of the operation of the proposed development.
- Operational effects on telecommunications: BT and JRC have highlighted that there are no telecommunication links within, or in the vicinity of, the site which could experience interference from the proposed development (see Table 13.1).
- Radio broadcasting: it is not considered likely that radio broadcasting signals will be affected by the proposed development once operational. This is because i) the length of radio broadcast signal wavelengths are such that interference from wind turbines is unlikely and ii) any interference to the radio signal is unlikely to noticeably affect the audio signal.

Shadow Flicker

13.37 Shadow flicker is an effect that can occur when the shadow of a moving wind turbine blade passes over a small opening (e.g. a window), briefly reducing the intensity of light within the room, and causing a flickering to be perceived. THC's Onshore Wind Energy Supplementary Guidance (November 2016) states that "*Wind energy schemes should always be designed to avoid causing shadow flicker, blade glint, glare and light effects to any regularly occupied buildings not associated with the development*".

13.38 Where this cannot be achieved, the Council expects wind energy developments to be located a minimum distance of 11 times the blade diameter of the turbine(s) from any regularly

occupied buildings not associated with the proposed development. Within a distance less than 11 times the blade diameter, a shadow flicker assessment will be required. The increase in distance from the widely accepted 10 times rotor diameter to 11 is to account for the northern latitudes of the Highlands and is in line with the conclusions of the DECC Update of UK Shadow Flicker Evidence Base, 2011. There are no properties within 11 rotor diameters of any turbines.

Ice Throw

13.39 The Scottish Government's web-based renewables advice for onshore wind turbines states that "*the build-up of ice on turbine blades is unlikely to present problems on the majority of sites. When icing occurs, the turbines' own vibration sensors are likely to detect the imbalance and inhibit the operation of the machines*". In addition, the Applicant will implement measures to ensure the safety of workers and the general public in relation to ice throw and ice fall, including notices throughout the site alerting members of the public of the possible risk of ice throw and ice fall under certain conditions. Further details relating to ice throw are provided in **Chapter 4: Development Description**.

Dust

13.40 The Design Manual for Roads and Bridges (DMRB)³ states that the locations of 'sensitive receptors' within 200m of construction areas should be identified and mitigation measures to reduce dust effects be applied. During construction, dust will be managed through measures set out in the CDEMP, including:

- Site tracks to be damped down using bowser or other suitable system;
- Road sweeper to be used to remove loose material from adjacent public roads during construction;
- Cleaning of vehicles, including provision of waterless wheel washing facilities, prior to exiting site onto the public road;
- Soil erosion control measures;
- Speed limits to be put in place to ensure low vehicle speeds;
- Vehicle loads to be covered;
- Damping of dry excavations and cutting activities which generate dust; and
- Sequencing of works to minimise the time that soils are exposed.

13.41 During operation, there will be limited dust raising maintenance activities being undertaken and transport will also be limited.

Utilities

13.42 The disruption of services such as electricity and gas during construction and operation of the proposed development has been scoped out as none of these services will be affected.

³ Volume 11, section 3; available at <https://www.standardsforhighways.co.uk/dmrb/>.

Assessment Methodology

Guidance

13.43 The following guidance documents have been referred to in undertaking the assessments:

Climate Change Mitigation and Adaptation

- The Environmental Impact Assessment Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance⁴; and
- The Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation⁵.

Major Accidents and Disasters

- Major Accidents and Disasters in EIA: A Primer (IEMA, September 2020)⁶;
- The Cabinet Office National Risk Register of Civil Emergencies (2017 Edition)⁷;
- The International Federation of Red Cross & Red Crescent Societies Early Warning, Early Action⁸;
- The British Geological Survey (BGS), various webpages; and
- Delivering Proportionate EIA: A Collaborative Strategy for Enhancing UK Environmental Impact Assessment Practice (applies to climate change also)⁹.

Aviation and Air Safeguarding

- This assessment has been prepared with reference to CAA Civil Aviation Publication (CAP) 764, Policy and Guidelines on Wind Turbines (CAA, 2016). This is the primary guidance in relation to the assessment of wind turbines on aviation in the UK.

Consultation

13.44 In undertaking the assessment, consideration has been given to the scoping responses and other consultation undertaken as detailed in **Table 13.1** below.

Table 13.1: Consultation Responses

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action
Energy Consents Unit (ECU) [13/05/2020]	Formal Scoping Consultation	Advised that potential effects on Private Water Supplies (PWS) should be considered in the EIA Report.	PWS are discussed in Chapter 9: Hydrology, Hydrogeology, Geology and Peat . A Private Water Supply Risk Assessment is provided in Appendix 9.4.
The Highland Council (THC) [27/03/2020]			

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action
Scottish Environment Protection Agency (SEPA) [16/03/2020]			
Energy Consents Unit (ECU) [13/05/2020]	Formal Scoping Consultation	Where there is a demonstrable requirement for peat landslide hazard risk assessment, the assessment should determine whether the risks are acceptable and capable of being controlled by mitigation measures. The assessment should also follow best practice guidance issued by the Scottish Government.	A peat landslide hazard risk assessment has been prepared is provided as Appendix 9.2.
The Highland Council (THC) [27/03/2020]			
The Highland Council (THC) [27/03/2020]	Formal Scoping Consultation	Measures proposed to prevent contamination or physical disruption should be presented.	This is set out within the Schedule of Mitigation and included within the Outline CDEMP provided as Appendix 4.2.
The Highland Council (THC) [27/03/2020]	Formal Scoping Consultation	It is likely that the Council will require the developer to enter into a Wear and Tear Agreement, with a suitable financial road bond being provided.	As detailed in Chapter 10: Traffic and Transport , the Applicant will engage in further discussion with THC in relation to a Wear and Tear agreement.
The Highland Council (THC) [27/03/2020]	Formal Scoping Consultation	Carbon balance calculations should be undertaken and included within the EIA Report with a summary of the results provided, focussing on the carbon payback period for the wind farm.	A Carbon Balance Assessment is provided in Appendix 9.5 and the findings are summarised in this chapter.
The Highland Council (THC) [27/03/2020]	Formal Scoping Consultation	The EIA Report must recognise community assets that are currently in operation for example TV, radio, tele-communication links and	TV, radio and telecommunications have been scoped out as noted above.

⁴ IEMA (2017) The Environmental Impact Assessment Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance.

⁵ IEMA (2020), Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation.

⁶ <https://www.iema.net/resources/blog/2020/09/23/iema-major-accidents-and-disasters-in-eia-primer>

⁷ Cabinet Office (2017) National Risk Register of Civil Emergencies.

⁸ The International Federation of Red Cross & Red Crescent Societies (2008) Early Warning, Early Action.

⁹ IEMA (2017) Delivering Proportionate EIA: A Collaborative Strategy for Enhancing UK Environmental Impact Assessment Practice.

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action
		aviation interests including radar and MOD safeguards.	Aviation effects are detailed within this chapter
The Highland Council (THC) [27/03/2020]	Formal Scoping Consultation	There should be continued dialogue with HIAL over the impact on the radar at airports in the area.	Further dialogue is detailed in this table below.
The Highland Council (THC) [27/03/2020]	Formal Scoping Consultation	Consideration should be given to the potential health and safety risks associated with lightning strikes and ice throw given the proximity of the proposed development to recreational routes.	Health and safety and ice throw are considered in Chapter 4: Development Description . Ice throw has been scoped out of detailed assessment as noted above.
The Highland Council (THC) [27/03/2020]	Formal Scoping Consultation	The EIA Report needs to address all relevant climatic factors which may influence the impact range of many of factors such as dust, air borne pollution, vapours, noise, light and shadow-flicker.	Climatic factors are discussed within the Baseline Conditions and Likely Significant Effects section of this chapter.
The Highland Council (THC) [27/03/2020]	Formal Scoping Consultation	Regarding shadow flicker, if there are no properties within 11 rotor diameters the matter of shadow flicker will not require detailed assessment but should still be addressed in the EIA Report.	There are no properties that will be affected, and therefore no detailed assessment has been undertaken.
East Nairnshire Community Council [17/03/2020]	Formal Scoping Consultation	The Highland Council Fire Brigade should be contacted following moorland fires within the area with appropriate mitigation measures outlined within the report.	Details on management of fire risk are set out in CMS/CEMP.
Scottish Natural Heritage (as was ¹⁰) [03/04/2020]	Formal Scoping Consultation	A peat depth survey and peat stability assessment to determine the location of infrastructure, the risk to habitats and species	A Peat Slide Risk assessment is provided as Appendix 9.2.

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action
		should be presented in the EIA Report.	
Scottish Natural Heritage (as was) [03/04/2020]	Formal Scoping Consultation	The EIA Report should contain details of any mitigation measures which have been incorporated to ensure the protection of the carbon rich soils, deep peat and priority peatland habitats.	Mitigation measures are set out within Chapter 9: Hydrology, Hydrogeology, Geology and Peat .
Highlands and Island Airport [06/03/2020]	Formal Scoping Consultation	While there will be cooperation with the developer, the HIAL currently objects to the proposed development as it falls inside the Safeguarding Area and therefore may impact Instrument Flight Procedures and Navigation Aids, such as radar.	Further consultation is summarised below, mitigation measures are set out in this chapter
Highlands and Island Airport [06/03/2020]	Formal Scoping Consultation	The development falls within the safeguarded areas for Inverness Airport and the turbines could impact upon the performance of electronic aeronautical equipment systems for the airport. This could lead to a degradation of these services, particularly in relation to radar installation.	Further consultation is summarised below, and mitigation measures are set out in this chapter
Highlands and Island Airport [06/03/2020]	Formal Scoping Consultation	The development may affect the Instrument Flight Procedures (IFPs) at Inverness Airport.	Further consultation is summarised below, and mitigation measures are set out in this chapter
Defence Infrastructure Organisation [05/05/2020]	Formal Scoping Consultation	Advised that 14 of the turbines presented in the scoping layout may be visible by the Air Traffic Control radar at RAF Lossiemouth and requested that the turbines should be fitted with MOD accredited aviation safety lighting.	Further consultation is summarised below, and mitigation measures are set out in this chapter

¹⁰ Scottish Natural Heritage (SNH) changed its name to NatureScot at the end of August 2020; due to the timescales in which the Cairn Duhie EIA Report was drafted, these terms are used interchangeably within this chapter.

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action
NATS Safeguarding [25/02/2020]	Formal Scoping Consultation	Confirmed they have no safeguarding objection to the proposed development.	Noted.
Joint Radio Company [26/02/2020]	Formal Scoping Consultation	Confirmed that there are no potential problems based on known interference scenarios and the proposal has been cleared with respect to radio link infrastructure.	Noted.
British Telecom [04/03/2020]	Formal Scoping Consultation	Confirmed that the proposed development should not cause interference to BT's current and planned radio network.	Noted.
The Coal Authority [05/03/2020]	Formal Scoping Consultation	Confirmed that there are no specific comments or observations and that further consultation with the Coal Authority is not required.	Noted.
HIAL [11/06/2020]	Further Consultation	HIAL stated that the lack of mention of aviation lighting in Scoping did not indicate it was not required. Following an expert report commissioned by the Applicant, HIAL confirmed there would be an impact on the Air Traffic Control Surveillance Minimum Altitude Chart (ATCSMAC).	Further consultation is summarised below.
HIAL [06/07/2020]	Further Consultation	HIAL indicated a full review of the ATCSMAC would be required to address the operational impact.	Further consultation is summarised below, mitigation measures are set out in this chapter.
HIAL [09/09/2020]	Further Consultation	HIAL restated a full review of the ATCSMAC would be required at the Applicant's cost. They also stated that 200 candela aviation would be required on the 4 turbines at the outer	Further consultation is summarised below, mitigation measures are set out in this chapter.

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action
		extremities of the Development Site.	
DIO [20/08/2020]	Further Consultation	DIO stated until the new radar antenna has been installed at RAF Lossiemouth it is not possible to confirm how many turbines will be visible.	Mitigation measures are set out in this chapter
DIO [17/09/2020]	Further Consultation	DIO stated MOD would require cardinal turbines to be fitted with combi lighting and the remainder of the perimeter turbines to be fitted with 25cd visible or IR lighting.	Mitigation measures are set out in this chapter
HIAL [06/10/2020]	Further Consultation	HIAL acknowledged 200 candela lighting was not standard so 2000 candela would be acceptable.	Further consultation is summarised below.
HIAL [19/10/2020]	Further Consultation	HIAL said if the Applicant wanted to consult with the CAA on the request for aviation lighting, they would be willing to reconsider, should the CAA advise otherwise.	Further consultation is summarised below.
CAA [05/11/2020]	Further Consultation	Given the location of the site, the proposed heights of the turbines and their distance and orientation to the runway direction at Inverness, there is no CAA requirement for the turbines to be lit	Noted.

Baseline Characterisation

Study Area

Climate Change Mitigation and Adaptation

- 13.45 The assessment considers the effects of the proposed development on the global climate, with specific reference to the climate changes expected in the UK. These have been defined using the UK's climate change projections (UKCP18), which allow climate changes to be projected at the regional level; in this case, North Scotland. The effects of a changing climate

on the proposed development have largely been considered in relation to the site and its immediate surroundings.

Major Accidents and Disasters

13.46 The assessment has focussed on the site itself in relation to the potential for major accidents and disasters.

Aviation and Air Safeguarding

13.47 Consideration is given to aviation infrastructure that is within operational range of the proposed development. Operational range varies with the type of infrastructure but broadly includes regional and military airports operating radar within 30km of the proposed development, non-radar aerodromes within 17km, parachute drops zones within 3km, military Air Defence Radar (ADR) and en-route radar systems up to 100km of the site (dependent on operational range).

Desk Study

13.48 The following data sources have been used to inform the assessments:

Climate Change Mitigation and Adaptation

- UK Climate Projections¹¹; and
- Cairn Duhie Appendix 9.5: Carbon Balance Calculation (2020).

Major Accidents and Disasters

- The International Disaster Database¹²;
- Cairn Duhie Appendix 9.2 Peat Landslide Hazard and Risk Assessment (2020).

Aviation and Air Safeguarding

13.49 The Applicant has a dedicated aviation manager who has provided input to the proposed development since its inception. This has included:

- civil and military radar line of sight (LoS) analysis;
- review relevant aviation charts;
- review of military low flying charts; and
- general aviation advice based on prevailing civil and aviation issues.

Field Survey

13.50 The assessments presented in this chapter have been desk based, drawing largely from published guidance and data. Peat depth probing was undertaken to inform the layout of the proposed development, and this data was also used to inform the carbon balance assessment (see Appendix 9.5: Carbon Balance Assessment).

Significance Criteria

Climate Change Mitigation

13.51 With respect to climate change and significance of effect, as yet, there are no established thresholds for assessing the significance of an individual development's contribution to climate change. However, the IEMA EIA Guide to Assessing Greenhouse Gas Emissions¹³ states the following (in Section 6):

“GHG emissions have a combined environmental effect that is approaching a scientifically defined environmental limit, as such any GHG emissions or reductions from a project might be considered to be significant....Therefore in the absence of any significance criteria or a defined threshold, it might be considered that all GHG emissions are significant and an EIA should ensure the project addresses their occurrence by taking mitigating action”.

13.52 Appendix C of the above guidance also refers to the following principles:

- *“Where GHG emissions cannot be avoided, the EIA should aim to reduce residual significance of a project's emissions at all stages”.*
- *“Where GHG emissions remain significant, but cannot be farther reduced... approaches to compensate the project's remaining emissions should be considered.”*

13.53 Furthermore, the guidance also states the following (in Appendix C):

“When evaluating significance, all new GHG emissions contribute to a significant negative environmental effect...The significance of a project's emissions should therefore be based on its net impact, which may be positive or negative.”

13.54 For the purposes of this assessment, the above guidance has been interpreted as outlined in Table 13.2 below, and this has been used to determine significance of effects.

Table 13.2: Significance Criteria

Significance of Effect	Description
No effect	The proposed development will achieve net zero carbon emissions (i.e. it is a 'carbon neutral development').
Positive effect (major, moderate, minor significance)	The proposed development will remove more carbon emissions from the atmosphere than it creates (i.e. it is a 'carbon negative development'). Further evaluation will be required to determine whether this is of major, moderate or minor significance.
Negative effect (major, moderate, minor significance)	The proposed development will create more carbon emissions than it removes from the atmosphere (i.e. it is a 'carbon positive' development), Further evaluation will be required to determine whether this is of major, moderate or minor significance.

¹¹ Met Office (2020) UK Climate Projections. Available [online] at: <http://ukclimateprojections.metoffice.gov.uk/>

¹² Emergency Events Database (2009) The International Disaster Database. Available [online] at: <http://www.emdat.be/database>

¹³ IEMA (2017) The Environmental Impact Assessment Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance.

Climate Change Adaptation

13.55 With respect to climate change adaptation and significance of effect, IEMA's guidance¹⁴ explains that in determining significance, account should be taken of the susceptibility or resilience of a receptor to climate change as well as the value/importance of the receptor. A high value receptor that has very little resilience to changes in climatic conditions should be considered more likely to be significantly affected than a high value receptor that is very resilient to changes in climatic conditions. If there is uncertainty about how a receptor will adapt to a changing climate, then a precautionary approach should be adopted. Effects are judged to be either significant or not significant.

Major Accidents and Disasters

13.56 Although 'accident', 'risk' and 'disaster' are well known terms and are used in everyday language, there is potential for their meaning to be interpreted differently. IEMA's Major Accidents and Disasters in EIA: A Primer (2020, 'the Primer') provides definitions for these in an EIA context.

13.57 The Primer defines 'major accidents' as:

"Events that threaten immediate or delayed serious environmental effects to human health, welfare and/or the environment and require the use of resources beyond those of the client or its appointed representatives to manage. Whilst malicious intent is not accidental, the outcome (e.g. train derailment) may be the same and therefore many mitigation measures will apply to both deliberate and accidental events".

13.58 The Primer's definition of 'disaster' is:

"May be a natural hazard (e.g. earthquake) or a man-made/external hazard (e.g. act of terrorism) with the potential to cause an event or situation that meets the definition of a major accident".

13.59 Risk is defined in this Primer as:

"The likelihood of an impact occurring, combined with the effect or consequence(s) of the impact on a receptor if it does occur."

13.60 Two categories of effect are identified for the purposes of this assessment: 'significant' or 'not significant'; there are no degrees of significance identified, as any residual risk of a major accident or disaster is considered to be 'significant'. In addition, all effects are considered to be adverse.

13.61 Significant environmental effect (in relation to a major accidents and/or disasters assessment) is defined in the Primer as:

"Could include the loss of life, permanent injury and temporary or permanent destruction of an environmental receptor which cannot be restored through minor clean-up and restoration".

13.62 The duration of effects is highlighted in the definition and is therefore considered within this chapter.

Aviation and Air Safeguarding

13.63 Significance criteria for aviation impacts are typically difficult to establish; they are not strictly based on the sensitivity of the receptor or magnitude of change but on whether the industry regulations for safe obstacle avoidance or radar separation (from radar clutter) can be maintained in the presence of the wind turbines.

13.64 Any anticipated impact upon aviation stakeholders which results in restricted operations is therefore considered to be of significance.

Assessment Limitations

Climate Change Mitigation and Adaptation

13.65 In considering future climate change scenarios, IEMA guidance recommends the use of the UK Climate Projections Website¹⁵. 'Probabilistic' projections are provided for a range of variables including temperature, precipitation and sea level rise. Wind speed and storm frequency/intensity are considered separately as global modelling information is currently more limited.

13.66 The current projections, UKCP18, released in November 2018, are now the most up to date climate change projections available. The Climate Projections website states that UKCP18 provides a valid assessment of the UK's future climate over land, but that when considering decisions that are sensitive to projected future changes in summer rainfall, additional information should also be used.

13.67 The UKCP18 projections for temperature and precipitation are presented for the UK as a whole and also on a regional basis. The UK projections consider three variables:

- Timeframe: the projections are presented for four overlapping time periods (2020s, 2040s, 2060s and 2080s);
- Probability: The projections are provided as probability distributions rather than single values, with figures provided for 5, 10, 50, 90 and 95% probability.
- Representative Concentration Pathways (RCP): Four pathways have been adopted; RCP2.6, RCP4.5, RCP6.0 and RCP8.5. These pathways describe different GHG and air pollutant emissions as well as their atmospheric concentrations and land use with each one resulting in a different range of global mean temperature increases over the 21st century. RCP2.6 represents a scenario which aims to keep global warming likely below 2°C compared to pre-industrial temperatures. RCP4.5 and RCP6.0 represent intermediate

¹⁴ IEMA (2020), Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation.

¹⁵ Met Office (2020) UK Climate Projections. Available [online] at: <http://ukclimateprojections.metoffice.gov.uk/>

scenarios while RCP8.5 describes a very high GHG emission scenario. All scenarios are considered to be equally plausible.

13.68 Table 13.3 below explains the assumptions made in applying the UKCP18 projections to the assessment of the proposed development.

13.69 Table 13.3: Climate Change Assumptions

Variable	Assumptions	Rationale
Timeframe	2050s	This is considered a realistic timeframe given the design life of the proposed development.
Probability	50th percentile used to establish what is projected as the central estimate with consideration given to lowest (5th) and highest (95th) percentiles to determine the lowest and highest projections that could happen within the timeframe.	The UK Climate Projections Website states that: By providing a range of results rather than single best estimate values, a clearer picture can be provided regarding the level of confidence in different outcomes.
RCP	RCP8.5	RCP8.5 is selected as recommended in the IEMA guidance and allows for a worst-case scenario future climate to be defined resulting in a conservative assessment.

13.70 No calculation has been undertaken in relation to direct CO₂ and NO_x emissions from HGV vehicles, and so a qualitative approach has been used.

Major Accidents and Disasters

13.71 There is no established guidance for determining the significance of effects in EIA terms for major accidents and disasters, however the IEMA Primer (2020) offers an example approach which has been taken forward in this assessment.

13.72 It is assumed that existing legislation and regulatory controls would not permit the proposed development to be progressed under circumstances which could result in a highly likely and high consequence event occurring and resulting in a significant effect.

Aviation and Air Safeguarding

13.73 No limitations have been identified that would affect the findings of the assessment, based on the information available at the time of writing.

Baseline Conditions

Current Baseline

Climate Change Mitigation and Adaptation

13.74 Table 13.4 below outlines the projected changes in temperature, precipitation and wind speed and storms by the 2050-2069, assuming a 50th percentile probability.

Table 13.4: Projected Climate Change

Climate Variable	Projected change
Temperature	Temperatures in North Scotland are projected to increase, with projected increases in summer temperatures greatest. The central estimate of increase in winter mean temperature is 1.8°C; it is very unlikely to be less than 0.2°C and is very unlikely to be more than 3.2°C. The central estimate of increase in summer mean temperature is 1.7°C; it is very unlikely to be less than 0.1°C and is very unlikely to be more than 3.5°C.
Precipitation	Winter rainfall is projected to increase, and summer rainfall is most likely to decrease. The central estimate of change in winter mean precipitation is 15%; it is very unlikely to be less than -7% and is very unlikely to be more than 41%. The central estimate of change in summer mean precipitation is -6%; it is very unlikely to be less than -28% and is very unlikely to be more than 14%. The UKCP18 projections show a general trend towards warmer, wetter winters and hotter, drier summers. However, it should be noted that rainfall patterns across the UK are not consistent and will vary dependent on seasonal and regional scales and will continue to vary in the future.
Wind speed and storms	Changes in wind speeds are not currently available at the regional level and there remains considerable uncertainty in the projections, with respect to wind speed. However, there are small changes in projected wind speed (Defra, DECC and Met Office, 2010). Across the UK, near surface wind speeds are expected to increase in the second half of the 21st century with winter months experiencing more significant impacts of winds (Met Office, 2018). This is accompanied by an increase in frequency of winter storms over the UK. However, the increase in wind speeds is projected to be modest.

13.75 With respect to climate change adaptation over the lifespan of the proposed development, baseline conditions are expected to be influenced by projected climate change as follows:

- **Chapter 5: Landscape and Visual Impact Assessment:** The Landscape Institute's position statement on climate change acknowledges that changes in average temperatures, precipitation and extreme weather events will have an effect on the landscape. However, whilst a change in rainfall and rising temperatures are anticipated, it is not considered that this will materially change the baseline landscape conditions.
- **Chapter 6: Cultural Heritage:** As outlined in HES (2019) 'A Climate Change Risk Assessment', increased water and moisture are major factors in chemical, biological and physical decay processes that are prolific in the deterioration of stonework. This, in

combination with increased vegetation growth, has the potential to affect stone-built heritage assets. Warmer and drier summers, with longer spells of dry weather, and an increased risk of forest and moorland fires could also damage any cultural heritage within the site.

- **Chapter 7: Ecology and Chapter 8: Ornithology:** Changes in climate (most likely temperature increases and winter rainfall increases) may over the long-term (i.e. within the next 350 years, but likely to continue permanently beyond that) affect habitats and prey abundance and availability. Bird populations dependent upon invertebrates may be most affected. Overall, there may be long term changes to abundance, distribution and sensitivity of some key species.
- **Chapter 9: Geology, Hydrology, Hydrogeology and Peat:** Climate change may cause changes in water regime and surface ground conditions, including erosion. The increase of winter rainfall, and changes to rainfall patterns, may cause an increase to, and result in more frequent flooding within watercourses and associated flood plains.
- **Chapter 10: Traffic and Transport:** It is assumed that, at a regional level, appropriate measures will be put in place to ensure flood risk is managed and does not have long term effects on transport infrastructure.
- **Chapter 11: Noise:** The consequences of the projected climate change scenario are unlikely to substantially affect baseline noise conditions given that periods of rainfall are excluded and the variation with wind speed was taken into account, in line with requirements of ETSU-R-97 and current good practice.
- **Chapter 12: Socio-Economics, Tourism and Recreation:** It is assumed that, at a regional level, appropriate measures will be put in place to ensure flood risk is managed and does not have long term effects on economic, tourism and recreational activity.

Major Accidents and Disasters

13.76 Based on the information sources consulted, knowledge of the site, findings of the EIA and issues raised by consultees, and taking account of the type of development being assessed, Appendix 13.1 presents a high level screening exercise which has been undertaken to identify potential major accident and disaster risks. It is important to note that as this covered all risks and disasters on a global scale, some risks were not applicable to the site, and the major accident or disaster was screened out. Those major accidents and disasters that could not be screened out, and therefore require further consideration in this chapter, are detailed below in Table 13.5. This table responds to the three questions identified in the Primer.

Table 5: Screened in Major Accidents and Disasters

Major accident / disaster carried forward	Is the development a source of hazard that could result in a major accident and/or disaster?	Does the development interact with any external sources of hazard?	If an external man-made or natural hazard occurred, would the presence of the development increase the risk of significant environmental effect to an environmental receptor occurring?	Mitigation and residual effects
Cyclones/ hurricanes/ typhoons, storms and gales	No.	Yes - see column four.	Yes. With regard to turbine mechanical/ structural failure and storms, turbines occasionally have to shut down in very high winds, however mechanical failure can result in turbines not responding to wind speed which in rare occasions can lead to them catching fire. This occurred at Ardrossan Wind Farm in 2011. Blade failure such as shearing has also been known and thought to be as a result of high wind speeds. This occurred at Whitelee Wind Farm in 2010. More recently (2018), a wind turbine at Ransonmoor Wind Farm in Cambridgeshire caught fire, which was thought to be as a result of lightning strike. In 2018, a commercial turbine tower buckled under high winds in Chatham-Kent leaving the remaining tower section, hub and blades on the ground. Such incidents are, however, extremely rare, and the Applicant is not aware of any injuries to members of the public caused by operational turbines.	No mitigation as all health and safety risks have been taken account of and their consideration reflected in the design. No significant effects.
Fire within a turbine	Yes - see column four.			
Employee safety during turbine maintenance				
Transport Accidents	Yes. The construction phase of the proposed development will	No.	No.	Chapter 10: Traffic and Transport concludes that the provision of

Major accident / disaster carried forward	Is the development a source of hazard that could result in a major accident and/or disaster?	Does the development interact with any external sources of hazard?	If an external man-made or natural hazard occurred, would the presence of the development increase the risk of significant environmental effect to an environmental receptor occurring?	Mitigation and residual effects
	involve materials and construction workers travelling to the site.			a Construction Traffic Management Plan (CTMP) will result in a minor effect so no significant effects are identified.
Pollution Accidents	Yes. During the construction phase, a large spillage of materials, particularly liquids, could result in significant adverse effects on environmental receptors.	No.	No.	During the construction of the proposed development, a Construction and Decommissioning Environmental Management Plan (CDEMP) will be produced and all construction activities will need to adhere to this document which will reduce the risk of a major accident/ disaster occurring. No significant effects.
Electricity failure	Yes. A system failure could potentially lead to significant adverse effects on human health damage structures and/or infrastructure.	Yes. The turbine structures and infrastructure may be affected.	Yes. The natural environment within and beyond the application boundary could be adversely affected if a fire is started.	There are a number of response measures in place (such as emergency contact numbers) that can deal with any of these failures provided by the utility provider. In addition, 999 is an emergency

Major accident / disaster carried forward	Is the development a source of hazard that could result in a major accident and/or disaster?	Does the development interact with any external sources of hazard?	If an external man-made or natural hazard occurred, would the presence of the development increase the risk of significant environmental effect to an environmental receptor occurring?	Mitigation and residual effects
				service response that deals with all major accidents and disasters. These responses reduce potential significant adverse effects on human receptors and the built infrastructure.
Wildfires	Yes, if manmade. No, if natural (e.g. ignition from lightning strike).	Yes. If the infrastructure catches fire, the fire could spread to the surrounding vegetation. However the field survey results presented in Chapter 7: Ecology found that almost 60% of the site (395.6 ha) is blanket bog.	No. There are no ecology statutory designations within the site. However the field survey results presented in Chapter 7: Ecology found that almost 60% of the site (395.6 ha) is blanket bog.	No significant effects.

Aviation and Air Safeguarding

Civil Aviation

- 13.77 The proposed development is approximately 22km south east of Inverness Airport.
- 13.78 HIAL has indicated that the proposed development will have an unacceptable impact upon the primary radar at Inverness Airport as it has LoS to all turbines at the proposed development.
- 13.79 HIAL has indicated that the proposed development will have an unacceptable impact upon the ATCSMAC at Inverness Airport.
- 13.80 HIAL has highlighted a potential requirement for the proposed development to have visible lighting to assist in avoiding the proposed development.

Military Aviation

- 13.81 RAF Lossiemouth is located approximately 34km to the north east of the proposed development.
- 13.82 The DIO has indicated that the proposed development may have an unacceptable impact upon the existing ATC radar at RAF Lossiemouth as the radar head at RAF Lossiemouth may have LoS to some of the turbines at the proposed development.
- 13.83 As part of the Ministry of Defence's (MOD) Project Marshall, to replace military radar throughout the UK, a new primary radar is to be installed at RAF Lossiemouth. When the new radar is installed at RAF Lossiemouth, it is still anticipated that many of the turbines at the proposed development will have LoS to the new radar head.
- 13.84 The DIO has highlighted the requirement for the proposed development to agree a suitable scheme of combi and infrared lighting to assist military aircraft in avoiding the proposed development.

Future Baseline

- 13.85 If the proposed development was not to proceed, there will be little or no change to the baseline conditions as set out above, with changes anticipated as a result of climate change taken into account in the assessment.

Cairn Duhie Wind Farm Design Considerations

- 13.86 The following modifications and design considerations have been made during the iterative EIA process, and relate to the issues considered in this chapter:
- identification of areas of deep peat to protect from physical damage, minimise excavation and transportation; and
 - identification of PWS source locations, to protect them from physical damage or pollution.
- 13.87 Modern turbines are designed and constructed to withstand the forces likely to be exerted on them, often in remote environments which are regularly subject to high wind speeds. Adherence to relevant design and safety standards ensures that there is extremely limited risk of structural failure of turbines or foundations.
- 13.88 As stated above, the purpose of the proposed development is to generate electricity from a renewable source of energy, offsetting the need for power generation from the combustion of fossil fuels. Consequently, the electricity that will be produced by will result in a saving in emissions of CO₂ with associated environmental benefit.

Health and Safety

- 13.89 The Construction (Design and Management) Regulations 2015¹⁶ have formed an integral part of the conceptual design final layout of the proposed development. Any health and safety risks have been taken account of and their consideration reflected in the design. Surveys and investigations have been undertaken throughout the pre-consent phase to, as far as reasonably practicable, identify, manage and if possible, avoid any potential risks during construction.
- 13.90 All construction activities will be managed within the requirements of the Regulations and will not conflict with the Health and Safety at Work etc. Act 1974. To further reduce possible health and safety risks, a Health and Safety Plan for the project will also be drawn up. All staff and contractors working on the construction will be required to comply with the safety procedures and work instructions outlined in the Plan at all times, including the handling of material which may have elevated levels of heavy metals.
- 13.91 To ensure that hazards are appropriately managed, risk assessments will be undertaken for all major construction activities, with measures put in place to manage any hazards identified.

Construction and Decommissioning Environmental Management Plan (CDEMP)

- 13.92 Prior to the construction of the proposed development, the Applicant will develop a detailed CDEMP with the appointed Principal Contractor. The CDEMP (which is provided at Appendix 4.2) establishes the project management structure and clearly identify the roles and responsibilities in the management and reporting on the construction phase environmental aspects. The CDEMP will be used to ensure that all relevant planning conditions and mitigation identified within the EIA Report to protect the environment are implemented through agreed procedures and working methods. Adherence to the CDEMP, as well as referenced legislation and guidance documents, will be a contractual requirement for the appointed Principal Contractor and their sub-contractors.
- 13.93 The purpose of the CDEMP will be to:
- provide a mechanism for ensuring that construction methods avoid, minimise and control potentially adverse significant environmental effects, as identified in the EIA Report;
 - ensure that good construction practices are adopted and maintained throughout the construction of the proposed development;
 - provide a framework for mitigating unexpected effects during construction;
 - provide assurance to third parties that agreed environmental performance criteria are met;
 - establish procedures for ensuring compliance with environmental legislation and statutory consents; and

¹⁶ Construction (Design and Management) Regulations 2015

- detail the process for monitoring and auditing environmental performance.
- 13.94 The CDEMP will be developed by the appointed Principal Contractor, agreed with the Applicant and will be updated when necessary to account for changes or updates to legislation and good practice methods throughout the construction phase. The CDEMP will also be amended to incorporate information obtained during detailed ground investigations which will be undertaken post consent and prior to construction activities. Compliance with the CDEMP (including procedures, record keeping, monitoring and auditing) will be overseen by a suitably qualified and experienced Ecological Clerk of Works (ECOW).
- 13.95 The CDEMP will contain the following documents, which the Principal Contractor and their sub-contractors will be required to adhere to throughout the construction process:
- A Pollution Prevention Plan (PPP);
 - Construction Method Statements (CMS);
 - A Peat Management Plan (PMP) (following the principles set out in the outline PMP at Appendix 4.3);
 - A Site Waste Management Plan (SWMP);
 - A Construction Traffic Management Plan (CTMP);
 - A Site Restoration Plan; and
 - A Decommissioning Plan.

Micrositing

- 13.96 It is not considered that micrositing of infrastructure within the proposed 50m micrositing tolerance would have any implications for the effects set out below.

Likely Significant Effects

Embedded Mitigation Measures

- 13.97 During the construction phase, adherence to the CDEMP will be in place through planning conditions. Furthermore, activities carried out during the construction phase will need to be in line with health and safety regulation and legislation.
- 13.98 Similarly activities carried out onsite during the operation phase will be done in accordance with relevant regulations, legislation and guidance.
- 13.99 Turbines at cardinal points of the proposed development will have installed visible 25 candela obstacle lighting with perimeter turbines being installed with infrared obstacle lights.

Construction Effects

Predicted Construction Effects

Carbon Losses and Direct CO₂ and NO_x Emissions from HGV Vehicles

- 13.100 Carbon dioxide emissions during the life of a wind turbine include those that occur during production, transportation, erection, operation, dismantling and removal of turbines and foundations.
- 13.101 The highest levels of vehicle movements associated with the proposed development will occur during construction. In the traffic assessment, it is estimated that the maximum traffic effect associated with construction of the proposed development is predicted to occur in month six of the construction programme. During this month, an average of 40 HGV movements is predicted per day and it is estimated that there would be a further 66 car and light van movements per day to transport construction workers to and from the site.
- 13.102 Whilst CO₂ and NO_x emissions have not been calculated for the construction vehicles associated with the construction period, it is considered that the opportunity to use the onsite borrow pit for the majority of stone requirements will significantly reduce predicted HGV traffic movements and the associated emissions. In addition, the concrete batching will be undertaken onsite which will reduce concrete delivery requirements.
- 13.103 On the whole, however, and despite the use of the onsite borrow pit providing the majority of stone aggregate required and concrete batching being potentially undertaken onsite, the proposed development will create more carbon emissions than it removes from the atmosphere during construction i.e. it will be 'carbon positive', and in accordance with the assessment methodology, a **negative effect of minor significance** is predicted.

Proposed Mitigation

Carbon Losses and Direct CO₂ and NO_x Emissions from HGV Vehicles

- 13.104 No specific mitigation measures are proposed in relation to climate change, although an Outline Construction Traffic Management Plan (CTMP) will be implemented as good practice, with the intention that measures will be implemented to ensure traffic movements are undertaken efficiently during construction, and unnecessary journeys avoided.

Residual Construction Effects

- 13.105 The residual effects are considered to be not significant and will remain as **minor**.

Operational Effects

Predicted Operational Effects

Carbon Losses and Carbon Offsetting

- 13.106 One of the key aims of Appendix 9.5: Carbon Balance Assessment was to calculate the 'payback time' of CO₂ emissions for the proposed development.

13.107 The payback time is defined as the length of time (in years) required for the proposed development to be considered a net avoider of emissions rather than a net emitter. The expected carbon payback period, assuming that the proposed development will offset the emissions associated with fossil fuel electricity generation, is calculated to be in the region of 0.8 to 1.6 years. Assuming a 35-year operational life, this equates to a carbon saving of approximately 83,974tCO₂ per year and approximately 2,939,090tCO₂ over the lifetime of the proposed development.

13.108 Whilst it has not been possible to calculate construction traffic emissions for HGVs and personnel, overall it is considered that these will be offset during the proposed development's operational life along with any backup generation required, and that a positive effect of moderate significance is likely on balance. The carbon offset by the proposed development will contribute positively to meeting Scotland's targets for reducing greenhouse gas emissions.

13.109 There is a national requirement to balance the peaks and troughs associated with electricity supply and demand to avoid strains on transmission and distribution networks, and to keep the electricity system stable. A battery storage facility is therefore proposed at the site to support the flexible operation of the National Grid and decarbonisation of electricity supply, which will contribute to the **moderate positive effect**.

Climate Change Adaptation

13.110 Taking account of those receptors identified above, under 'baseline conditions', as potentially susceptible to a changing climate, this section gives further consideration as to whether or not the introduction of the proposed development is likely to affect judgements of effects and/or the ability of the receptors within or close to the site to adapt to climate change.

- **Chapter 5: Landscape and Visual Impact Assessment:** It is anticipated that the introduction of the proposed development will have **no significant effects** on the landscape's capability to adapt to climate change.
- The Baseline Conditions section of **Chapter 9: Hydrology, Hydrogeology, Geology and Peat** states that the site is at 'little or no risk' of fluvial flooding. The majority of the site is also shown to be at 'little or no risk' of flooding from pluvial sources. All of the infrastructure of the proposed development will be located outside the small isolated areas of high, medium and low risk of pluvial flooding. Combined with appropriate site drainage measures, it is not considered likely that the introduction of the proposed development will result in increased flooding. Overall the wind farm has **no significant effects** on the ability of potential flood risk receptors to adapt to climate change.
- **Chapter 7: Ecology** and **Chapter 8: Ornithology:** Fluctuations in species behaviour and distribution are likely to occur at a local level, over time. With the implementation of appropriate site drainage measures, as noted above, it is not considered likely that the introduction of the proposed development will result in increased flooding which could otherwise lead to habitat loss or species displacement within the site. The Outline Habitat Management Plan (OHMP, Appendix 7.4) sets out that there will be maintenance, restoration and enhancement of blanket bogs and wet heath, which will lead to secondary benefits

for breeding and foraging. The OHMP also sets out there will be maintenance and enhancement of existing mosaic habitats for the benefit of the local breeding and wintering wader assemblages. Overall, the proposed development will have **no significant effects** on ornithological or ecological species' ability to adapt to climate change.

Major Accidents and Disasters

13.111 With regards to turbine mechanical/structural failure and storms, it is important to note that there are still large uncertainties in the future predictions of storms. Again, whilst there are only small changes in projected wind speed, there is considerable uncertainty with respect to likely changes in wind speed.

13.112 Modern turbines are fitted with sensors which detect if wind speeds are too high to operate safely, resulting in their shut down. This prevents excessive wear and damage to the gearbox and reduces the risk of turbines catching fire or occurrence of blade failure. The occurrence of wind turbines catching fire from suspected lightning strikes is also very rare, and there is no evidence that human life has been at risk from such events occurring in the past. The closest recreational path to the proposed turbines is the Moray Council Core Path DA05, which comprises the section of the Dava Way (approximately 2.5km at its closest point to the site boundary); however, it is considered that there is a very low risk of recreational receptors being at risk from structural failures given the reasons above. As a result, the risk of turbine mechanical/structural failure is considered to be **not significant**.

Aviation and Air Safeguarding

13.113 Wind turbines have the potential to impact the performance of air traffic control radars. These impacts include:

- The creation of 'false' targets, whereby the turbines present on the radar display. Multiple false targets can lead to the radar initiating false aircraft tracks.
- False returns can also cause track seduction, i.e. real aircraft tracks are 'seduced' away from the true position as the radar updates the aircraft track with the false return. This can lead to actual aircraft not being detected.
- Shadowing whereby the aircraft is not detected by the radar as it is flying within the physical 'shadow' of the turbine.

13.114 Prior to mitigation, it is considered that the proposed development would affect the operation of the primary radar at Inverness Airport, the primary radar at RAF Lossiemouth, and civil and military aircraft and would therefore be significant.

13.115 The airspace over the UK land mass is used to provide the UK Military Low Flying System to deliver essential military low flying training. The proposed development will occupy Low Flying Area 14 in which military fixed wing aircraft are permitted to fly down to 250 feet (76.2m) above terrain features.

13.116 It is considered by the DIO that the proposed will cause a potential obstruction hazard to these military low flying training activities.

Proposed Mitigation

Aviation and Air Safeguarding

- 13.117 There are a number of mitigation options available to alleviate problems caused by wind turbines to aviation and aviation radar. Mitigation solutions are highly specific to the effect in questions. Consultation with relevant consultees is key to establishing the appropriate method of mitigation.
- 13.118 A Radar Mitigation Scheme (RMS) will be agreed with the MOD that will remove or reduce to an acceptable level, the impact of the proposed development on the Marshall replacement RAF Lossiemouth radar. The RMS will be agreed prior to the proposed development becoming fully operational.
- 13.119 A proposed RMS was presented to the DIO in October 2020, outlining a solution to mitigate any impacts of the proposed development on the Lossiemouth primary radar. In October 2020, the DIO stated that, provided the design of the proposed development did not change significantly prior to full planning application, the proposal would be potentially acceptable to the MOD.
- 13.120 There are several technical solutions that have been developed to mitigate the type of impact the proposed development will have, and discussions with both the MOD and solution providers have commenced.
- 13.121 An RMS will be agreed with HIAL that will remove or reduce to an acceptable level, the impact of the proposed development on the Inverness primary radar. The RMS will be agreed prior to the proposed development becoming fully operational.
- 13.122 A full ATCSMAC review will be commissioned by the Applicant to identify whether or not an update is required to the ATCSMAC. Any update will be agreed prior to the proposed development becoming fully operational.
- 13.123 An aviation lighting scheme will be agreed with both HIAL and the DIO prior to the proposed development becoming fully operational.
- 13.124 Such an aviation lighting scheme will consist of visible 25 candela, red obstruction lighting on the cardinal turbines of the proposed development along with infrared obstruction lighting on the perimeter turbines.

Residual Operational Effects

- 13.125 There will be a **moderate positive effect** as a result of carbon offsetting once the proposed development is operational. All other residual effects are considered to be not significant.
- 13.126 Following implementation of additional mitigation, it is not considered that the proposed development would have any residual effects on aviation.

Interrelationship between Effects

- 13.127 This chapter discusses the effects of the proposed development on climate change mitigation and adaptation, major accidents and disasters and aviation and safeguarding. The assessment has drawn on findings of all the topic chapters (Chapters 5-12) within this EIA Report and the interrelationships are clearly noted above where relevant.

Summary

- 13.128 One positive significant effect (moderate effect) was identified during the operational phase for climate change.
- 13.129 Several significant effects were identified for the operational phase for which mitigation measures have been proposed. The implementation of such measures would lead to no significant residual effects on aviation during the operational phase.

Chapter 14: Summary

14. Summary

Introduction

- 14.1 Chapters 5 to 13 of this EIA Report present the findings of the assessments of the predicted effects of Cairn Duhie Wind Farm (the proposed development) on a topic-by-topic basis. The significance of these effects has been assessed using criteria defined in the topic chapters. Where appropriate, the significance of effects has been categorised as major, moderate, minor or negligible. In the context of the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 ('the EIA Regulations'), effects assessed as being of 'major' or 'moderate' significance are considered to be significant effects.
- 14.2 In line with Schedule 4 of the EIA Regulations, PAN 1/2013, and other relevant EIA guidance, the EIA Report has focused particularly on identifying significant environmental effects (both positive and negative) of the proposed development, during construction and operation (including cumulatively).
- 14.3 Table 14.1 summarises the predicted significant effects of the proposed development prior to and following the implementation of committed mitigation measures.

Summary of Effects

- 14.4 Prior to committed mitigation, significant effects are predicted in relation to:
- Landscape and Visual Impact Assessment;
 - Hydrology, Hydrogeology, Geology and Peat;
 - Other Issues (climate change - positive, and aviation).
- 14.5 Prior to committed mitigation, significant effects are not predicted in relation to the following topics:
- Cultural Heritage;
 - Ecology;
 - Ornithology;
 - Access, Traffic and Transport;
 - Noise; and
 - Socio-Economics, Recreation and Tourism.
- 14.6 Only effects which are considered to be significant prior to mitigation are presented in Table 14.1. All other effects are considered to be non-significant prior to mitigation and are therefore not presented.
- 14.7 As shown in Table 14.1, there is scope to mitigate the predicted significant effects with the exception of landscape and visual effects. Mitigation for landscape and visual effects, where possible, has been a key component of the design process for the proposed development, and as such, no additional mitigation measures are proposed.

Landscape and Visual Amenity

- 14.8 The Landscape and Visual Impact Assessment (LVIA) considers the potential effects of the proposed development on the landscape and visual resources of the site and the surrounding study area, during the construction and operational phases of the project.
- 14.9 Landscape character and resources are considered to be of importance in their own right and are valued regardless of whether they are seen by people. Effects on views and visual amenity as perceived by people are clearly distinguished from, although closely linked to, effects on landscape character and resources. Landscape and visual assessments are therefore separate, although linked, processes.
- 14.10 It should be noted that wind turbines, as tall man-made structures inherently result in changes to the landscape and visual amenity. The design of the proposed development has been landscape and visual led, and potential adverse effects have been mitigated as part of the design as far as possible. All remaining significant landscape and visual effects are therefore considered to be residual.

Landscape Effects

- 14.11 Overall, the effect of construction on the site is judged to be **moderate**. However, effects will be temporary and largely contained within the geographical extent of the site.
- 14.12 Once operational, the effects of the wind farm on the landscape of the site are judged to be **major**. The Open Rolling Upland (291) Landscape Character Type (LCT) in which the site is located comprises simple and expansive rolling heather moorland, bog and grasslands. This is a simple, large scale upland landscape which is well suited to wind farm development and significant effects on landscape character at the site level and locally are usually unavoidable for wind farm development. There are already a number of operational wind farm developments within the LCT including Tom nan Clach, Berry Burn and Paul's Hill. No significant effects on other LCTs are predicted.

Visual Effects

- 14.13 In terms of visual effects during the construction phase, beyond those experienced at the site level where low-level construction activity will be apparent in certain views, these will largely relate to views of tall cranes and turbine construction experienced from the wider study area. These effects will be transient and change throughout the construction phase as wind turbines are gradually constructed in sections. As such, visual effects during the construction phase are unlikely to exceed the level of effect associated with operational visual effects.
- 14.14 Significant visual effects are predicted at 15 of the 18 representative viewpoints during operation; noting, however, that the viewpoints were specifically selected to indicate locations where views will alter to a significant degree.

- 14.15 **Major** visual effects are predicted at viewpoint 1: A939 South of Ferness Village; viewpoint 2: Little Aitnoch; viewpoint 3: Hill track to Loch Kirkcaldy; viewpoint 5: A409, above Kerrow; viewpoint 6: A939, west of Aitnoch; viewpoint 8: Ardclach Bell Tower; viewpoint 9: Knock of Braemoray; and viewpoint 12: Drumguish Croft.
- 14.16 **Moderate** visual effects are expected at viewpoint 10: Cairn Glas Brae on the A939; viewpoint 11: B9007, Old Military Road; viewpoint 13: A940, Auchearn; viewpoint 14: A939 and Dava Way; viewpoint 15: Carn nan Gabhar above Lochindorb; viewpoint 16: Carn Kitty; and viewpoint 17: Carn Allt Laoigh.
- 14.17 **Minor** visual effects are expected for viewpoint 7: B9007, near Mount and viewpoint 18: Carn a'Ghille Chearr. A **Negligible** visual effect is expected for viewpoint 4: Ferness.
- 14.18 The effects on views from two settlements have been assessed: Ferness and Dava. The proposed development will give rise to a **negligible** effect on the settlement Ferness and a **major** (significant) effect on the settlement Dava, although this will be limited to a small number of properties on the edge of the settlement with more open views to the north-west.
- 14.19 The visual effects on views from five routes have been assessed. The proposed development will give rise to a **major** effect on the view from A939 Nairn to Tomintoul; a **moderate** effect on the view from A940 Forres to Dava; a **minor** effect on the view from B9007 Logie to Duthil; a **moderate** effect on the view from Dava Way (Core Path and promoted long-distance route); and a **minor** effect on NCN 1.
- Cumulative Operational Effects**
- 14.20 In terms of cumulative landscape effects, the proposed development is expected to have a **minor** effect on LCT 291 Open Rolling Upland (which includes the site) and LCT 290 Upland Moorland and Forestry LCT.
- 14.21 Cumulative visual effects of the proposed development on views seen from viewpoint 6: A939, west of Aitnoch and viewpoint 9: Knock of Braemoray are expected to be **moderate** under scenario 2 (operational, under construction and consented wind farms plus wind farms at appeal and scoping stage). The rest of the cumulative visual effects of the proposed development at various viewpoints, settlements and routes are expected to be **minor**.
- Cultural Heritage**
- 14.22 The proposed development's infrastructure would have direct effects on the grouse butts to the north of the site (SLR7), which were identified as potentially being used during World War II as military training trenches. The effect prior to mitigation on the grouse butts would be minor. There is also a trackway (SLR111) which would be directly affected. The historic trackway would be cut at multiple points although most areas would survive, creating an opportunity to acquire an insight into the composition of the trackway. The effect on the trackway would be negligible prior to mitigation.
- 14.23 Whilst significant effects are not predicted, a mitigation strategy has been set out for the direct effects identified above. A watching brief is proposed on elements of the ground works that have the potential to have direct impacts on SLR111 as well as unrecorded buried archaeology. A watching brief or archaeological trial trenching is proposed for SLR7, where the potential Second World War trenches to the north may be affected. The precise scope of the mitigation works would be negotiated with The Highland Council and the agreed mitigation programme would be documented in an agreed Written Scheme of Investigation.
- 14.24 The assessment has also considered the proposed development's potential indirect effects on designated heritage assets outwith the site, within the Outer Study Area. The proposed development is expected to have a minor impact on Arclach Bell Tower (LB551), Dunearn Fort (SM2470) and Aitnoch Cairn (SM4362). None of the effects are considered to be significant in the context of the EIA Regulations.
- Ecology**
- 14.25 The most tangible effect during the construction phase of the proposed development will be direct habitat loss due to new infrastructure. Much of this infrastructure will be permanent; however, the temporary construction compound, a batching plant and borrow pit will be restored at the end of construction. There may also be some indirect habitat losses to wetland habitats due to drainage effects.
- 14.26 The proposed development is expected to have a **minor** effect on Blanket Bog and Wet Dwarf Shrub Heath.
- 14.27 There is potential for displacement and/or disturbance to foraging and commuting bats during the construction of turbines and the minor felling of woodland to support infrastructure. Although some bat foraging or commuting behaviour may be slightly altered as a result of construction and minor woodland felling, a **negligible** effect is expected on bats during construction of the proposed development.
- 14.28 During operation, there is potential for collision risk to commuting and foraging bat species, together with the risk that bats may be affected by barotrauma when flying in close proximity of the turbine blades. The potential effects from barotrauma are assumed to be the same as for collision risk. The effect on common and soprano pipistrelle bats is considered **minor**.
- 14.29 There are no predicted significant effects on any of the receptors assessed in the ecological assessment, either during construction, operation, or cumulatively.
- Ornithology**
- 14.30 The species considered at risk of significant effects as a result of the proposed development are: capercaillie, greylag goose, pink-footed goose and a breeding wader assemblage (comprising curlew, golden plover and lapwing). Due to the proximity of the Moray and Nairn Coast Special Protection Area (SPA) and the Darnaway and Lethen Forest SPA and the potential for connectivity with the proposed development, the SPA populations of greylag goose and pink-footed goose (Moray and Nairn Coast SPA) and capercaillie (Darnaway and Lethen Forest SPA) were assessed under the Habitats Regulations.
- 14.31 Effects related to direct and indirect habitat loss, construction disturbance and displacement, operational displacement, collision risk and cumulative effects were all

considered. The residual effects are considered to be not significant, and to have no adverse effect on the integrity of the Moray and Nairn Coast SPA or Darnaway and Lethen Forest SPA under the HRA process.

14.32 Cumulative/in-combination effects in relation to capercaillie, greylag goose and pink-footed goose were scoped out due to the limited/negligible effects of the proposed development alone (and for capercaillie on the basis of recent cumulative and in-combination information provided for Clash Gour Wind Farm). Cumulative effects in relation to the breeding wader assemblage (curlew, lapwing and golden plover) were considered to be **minor**.

14.33 No significant residual effects are expected for assessed species or SPAs.

Hydrology, Hydrogeology, Geology and Peat

14.34 The proposed development may result in the following effects at the construction stage, however the risk of these occurring will be reduced through the implementation of a Construction Environmental Management Plan (an outline of which is provided as Appendix 4/2) which will ensure that, with the exception of a potential **moderate** effect on GWDTEs, none of the effects will be significant:

- increased sediment loads and acidification within runoff from disturbed ground, spoil heaps and excavations;
- accidental spillage/loss of chemicals and other construction materials;
- reduced water quality of the PWS receiving runoff from the Site; and
- disconnection of water supply to Groundwater Dependent Terrestrial Ecosystems (GWDTE).

14.35 With the implementation of mitigation, the effects during construction on GWDTE are also expected to be **minor**.

14.36 Once the proposed development is operational, accidental spillages/loss of chemicals or hydrocarbons and reduced water quality of the PWS receiving runoff from the site could potentially occur; although, after mitigation these effects are expected to be **negligible**.

Noise

14.37 A construction noise assessment carried out in accordance with BS 5228 1:2009 'Noise control on construction and open sites Part 1 - Noise' found that construction noise levels are predicted to temporarily exceed construction noise criteria at nearby properties. There may be an increase above the 55 dB(A) criteria level for Saturdays 13:00-19:00 at two properties although this can be mitigated by restricting the activities that are allowed to take place as necessary. At all other times, predicted noise from worst case combination of increased traffic and site construction noise would not exceed relevant criteria and therefore no significant impacts are expected.

14.38 With mitigation in place, vibration and air overpressure due to blasting are not expected to have a significant impact on nearby residents.

14.39 The predicted operational noise levels, with the suggested noise management strategy in place, are within noise limits derived in accordance with ETSU-R-97 at all properties at all considered wind speeds.

Socio-Economics, Recreation and Tourism (positive); and

14.40 It is considered that construction will have a **minor positive** effect on the local economy and employment in the Highland Council area. Creation of additional indirect employment from construction is also considered to be a **minor positive** effect for the local economy.

14.41 Due to their remote operational control and limited need for servicing, windfarms do not create large numbers of jobs during the operational stage, a **negligible** for the local economy is expected at this stage. The potential for indirect employment opportunities is limited during the operational stage and is considered to be **minor** for the local economy.

14.42 The site of the proposed development is not currently used for any formal public recreation activities and there are no known Rights of Way, core paths or wider network paths which cross it. Public access throughout the construction phase will be restricted and managed by the appointed Contractor for health and safety reasons in line with requirements of the Construction (Design and Management) (CDM) Regulations 2015.

14.43 It is not anticipated that the proposed development will directly affect public access or recreational activity during construction or operation, and therefore, a **negligible** effect is anticipated.

14.44 During construction, there will be some disruption to the main activities on site, i.e. grazing is likely to be temporarily disrupted. As such, it is considered that construction of the proposed development will have a **minor** effect on land use of the site for a limited period of time.

14.45 Once operational, the wind farm will provide a form of rural diversification in the area through income generated from the turbines. Furthermore, once the wind farm is operational, grazing and peat cutting can continue. It is considered that operation of the windfarm will have a **minor positive** effect on the land use of the site.

14.46 The effect of construction and operation of the proposed development on tourism will be **negligible**.

14.47 A **minor positive** effect is expected for direct employment, indirect employment and economic benefits at the construction and operational phases of the proposed development cumulatively with other schemes.

Other Issues

14.48 This chapter includes the assessment of the potential effects of the proposed development in relation to climate change mitigation (emissions reductions) and adaptation; major accidents and disasters; and aviation and air safeguarding.

Climate Change Mitigation

- 14.49 The proposed development will create more carbon emissions than it removes from the atmosphere during construction, and in accordance with the assessment methodology, a **minor** effect is predicted.
- 14.50 Carbon ‘payback’ time is calculated to be within the region of 0.9 to 1.7 years. Assuming a 35-year operational life, this equates to a carbon saving of approximately 83,974tCO₂ per year and approximately 2,939,090tCO₂ over the lifetime of the proposed development. As such, a **moderate positive** effect is predicted.

Climate Change Adaptation

- 14.51 No significant effects are predicted in relation to either the project’s resilience to climate change or in relation to the assessment findings within the EIA Report, when considered in combination with projected climate change.

Major Accidents and Disasters

- 14.52 The assessment of effects relating to the potential for major accidents and disasters to result in significant effects on the receptors considered in the EIA focussed on the potential for mechanical/structural malfunctions or storms, which could result in turbine failure and serious injury or loss of life once the proposed development is operational. The assessment concluded that the effects would not be significant.

Aviation and Air Safeguarding

- 14.53 The proposed development may have significant effects on the following areas of aviation and air safeguarding during the operation phase prior to mitigation:
- the operation of radar at RAF Lossiemouth;
 - the operation of radar at Inverness Airport;
 - Air Traffic Control management in relation to Inverness Airport; and
 - military night-time flight operations.
- 14.54 Implementation of radar mitigation schemes, a review and if necessary, amendment of Inverness Airport’s published Air Traffic Control Minimum Safe Altitude Chart, and the provision of a scheme of visible and infrared obstacle lighting would reduce the effects rendering them not significant.
- 14.55 Table 14.1 below summarises the predicted significant effects of the proposed development prior to and following the implementation of committed mitigation measures.

Table 14.1: Summary of Significant Effects

Predicted Effect	Significance of Effect	Mitigation	Significance of Residual Effect
Landscape and Visual Amenity			
Construction Effects			
Landscape effect of construction on the Site	Moderate (Significant)	n/a	Moderate (Significant)
Operational Effects on Landscape Receptors			
Operational landscape effects on the Site	Major (significant)	n/a	Major (significant)
Open Rolling Upland (291) LCT	Major (significant) for the site, moderate (significant) for areas of the Open Rolling Upland (291) LCT within 5km.	n/a	Major (significant) for the site, moderate (significant) for areas of the Open Rolling Upland (291) LCT within 5km.
Operational Effects on Visual Receptors			
VP1 - A939 South of Ferness Village	Major (significant)	n/a	Major (significant)
VP2 - Little Aitnoch	Major (significant)	n/a	Major (significant)
VP3 - Hill track to Loch Kirkcaldy	Major (significant)	n/a	Major (significant)
VP5 - A940, above Kerrow	Major (significant)	n/a	Major (significant)
VP6 - A939, west of Aitnoch	Major (significant) (Moderate for cumulative scenario 2)	n/a	Major (significant) (Moderate for cumulative scenario 2)
VP8 - Ardclach Bell Tower	Major (significant)	n/a	Major (significant)
VP9 - Knock of Braemoray	Major (significant) (Moderate for cumulative scenario 2)	n/a	Major (significant) (Moderate for cumulative scenario 2)
VP10 - Cairn Glas Brae on the A939	Moderate (significant)	n/a	Moderate (significant)
VP11 - B9007, Old Military Road	Moderate (significant)	n/a	Moderate (significant)
VP12 - Drumguish Croft	Major (significant)	n/a	Major (significant)
VP13 - A940, Auchearn	Moderate (significant)	n/a	Moderate (significant)
VP14 - A939 and Dava Way	Moderate (significant)	n/a	Moderate (significant)
VP15 - Carn nan Gabhar above Lochindorb	Moderate (significant)	n/a	Moderate (significant)

Predicted Effect	Significance of Effect	Mitigation	Significance of Residual Effect
VP17 - Carn Allt Laoigh	Moderate (significant)	n/a	Moderate (significant)
Dava	Major (significant) for a limited number of properties on the fringes of the settlement, with open views to the north-west.	n/a	Major (significant) for a limited number of properties on the fringes of the settlement, with open views to the north-west.
A939 Nairn to Tomintoul	Major (significant). This will be focused to the section of route which passes to the immediate west of the site and to the north of the CNP boundary.	n/a	Major (significant). This will be focused to the section of route which passes to the immediate west of the site and to the north of the CNP boundary.
A940 Forres to Dava	Moderate (significant) as the route passes to the east of the site.	n/a	Moderate (significant) as the route passes to the east of the site.
Dava Way	Moderate (significant) between Glaschoil and Dava.	n/a	Moderate (significant) between Glaschoil and Dava.
Hydrology, Hydrogeology, Geology and Peat			
Construction Effects			
Disconnection of water supply to GWDTE.	Moderate	Additional measures have been incorporated for the protection of the blanket bog in the vicinity of the temporary construction compound, batching plant, T11 and T7 and connecting stretches of track including: <ul style="list-style-type: none"> Identifying flush areas and natural depressions. Avoiding diverting flows away from the GWDTEs by drainage channels. Providing pipes and/or drainage matting to ensure hydraulic conductivity is 	Minor

Predicted Effect	Significance of Effect	Mitigation	Significance of Residual Effect
		maintained across the GWDTE	
Other Issues (positive)			
Operational Effects			
Climate Change Mitigation (emissions reduction)	Positive effect of moderate significance	n/a	Positive effect of moderate significance
Impact on aviation and air safeguarding, including: <ul style="list-style-type: none"> the operation of radar at RAF Lossiemouth; the operation of radar at Inverness Airport; Air Traffic Control management in relation to Inverness Airport; and military night-time flight operations. 	Significant	Radar mitigation schemes, a review and if necessary, amendment of Inverness Airport's published Air Traffic Control Minimum Safe Altitude Chart, and the provision of a scheme of visible and infrared obstacle lighting.	Not significant