Lewis Wind Power
Cumhachd Gaoithe

wood.

Stornoway Wind Farm Ltd

Stornoway Wind Farm

Volume 2

Environmental Impact Assessment Report

Wood Environment & Infrastructure Solutions UK Limited – April 2019

Report for

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1. Introduction

1.1 Consented Development

1.1.1 Stornoway Wind Farm gained section 36 consent and deemed planning permission in September 2012 to construct and operate 36 wind turbines and ancillary infrastructure. In May 2015, an application was made under the Electricity Act 1989 to amend this consent and the deemed planning permission, with regard to the layout, output and size of the wind turbines (up to 145m to tip) and amendments to certain aspects of the ancillary infrastructure, with this being granted on 22 March 2016 (hereafter referred to as the 'Consented Development'). Stornoway Wind Farm currently has a consented maximum generating capacity of 180MW.

1.1.2 A further direction to extend the commencement of development date to 06 September 2020 was granted in June 2017 (hereafter referred to as the '2017 Direction').

1.2 Overview of the Proposed Development

1.2.1 Stornoway Wind Farm Limited (the 'Applicant') is submitting an application under section 36 of the Electricity Act (1989) (as amended) to construct and operate the 'Proposed Development' comprising up to 35 turbines with a generating capacity in excess of 50MW on the site of the Consented Stornoway Wind Farm. The Applicant also seeks a direction from the Scottish Ministers pursuant to section 57(2) of the Town and Country Planning (Scotland) Act 1997 (as amended) that planning permission is deemed to be granted for the Proposed Development.

1.2.2 The site of the Proposed Development as shown on **Figure 1.1,** and hereafter referred to as the 'Development Site', is located to the south west of the town of Stornoway on the Isle of Lewis and centred on National Grid Reference (NGR) E137149, N933373. The geographical context of the Development Site is shown on **Figure 1.2**.

1.2.3 The Proposed Development comprises a different layout to that of the Consented Development, with two different turbine types. These would be 10 turbines up to 156m to tip and with a rotor diameter of up to 136m, and 25 turbines of up to 180m to tip and with a rotor diameter of up to 150m. The proposed blade tip heights and rotor diameters would facilitate the installation of modern technology on site, and an increase in potential renewable energy generation at the Site. This may increase generation from a nominal 180MW under the Consented Development to an indicative capacity based on current technology of around 196MW or more. For avoidance of doubt, this is not a limit on upper capacity for the Proposed Development, and the capacity could be different depending on the technology at the time of installation. However for use in this EIA, a reference turbine has been identified. Should consent be granted, the turbines installed at the site would fit the EIA design envelop as described in **Chapter 4: Project Description**. The specific choice of wind turbine to be installed would be determined following a future procurement exercise by the Applicant.

1.2.4 Taking into account that the turbines would not operate at full capacity all of the time, the amount of electricity produced by the Proposed Development has been estimated to be in the order of 820,707MWh per year which would be equivalent to the domestic needs of approximately 229,184 homes in Scotland. Further details of this are presented in **Appendix 9H** (Appendix F).

1.2.5 **Appendix 9H** (Appendix F) shows that approximately 352,904 tonnes of carbon dioxide may be saved each year as a result of the generation of electricity by the Proposed Development based on the expected results, rather than by conventional power stations using a range of fuel sources. Over its lifetime, the Proposed Development may therefore save approximately 8.8M tonnes of CO2 emissions based on the expected results.

1.2.6 Under section 36 of the Electricity Act 1989 (as amended), the Proposed Development would require consent from the Scottish Ministers as it would be a generating station with a capacity in excess of 50MW.

1.2.7 The Proposed Development falls within Schedule 2 of the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended) (the 'EIA Regulations'): a generating station, the construction of which (or the operation of which) will require a section 36 consent but which is not Schedule 1 development. A Schedule 2 development constitutes EIA development if the application is supported by an EIA Report, or if the development is likely to have significant effects on the environment by virtue of factors such as its nature, size or location. Due to the nature, size and location of the Proposed Development it is acknowledged that an EIA is required. Further details on the EIA regulations and process are set out in **Chapter 2: Approach to Preparing the EIA Report**.

1.3 The Project Team

1.3.1 This EIA Report has been prepared on behalf of the 'Applicant' (See **Section 1.7**) by Wood Environment and Infrastructure Solutions UK Ltd (Wood). Wood is registered with the Institute of Environmental Management and Assessment (IEMA)'s EIA Quality Mark scheme. The scheme allows organisations that lead the co-ordination of EIAs in the UK to make a commitment to excellence in its EIA activities and have this commitment independently reviewed.

1.3.2 A statement outlining the relevant experience and qualifications of the competent experts who have prepared this EIA Report is provided in **Table 1.1**.

Table 1.1 Environmental Topics to be Addressed in the EIA Report and Chapter References

Topic	Staff	Relevant expertise/qualifications
Chapter 5 **Planning and Energy Policy Context**	Adam Mealing	Msc Town Planning LMRTPI Bsc Business Studies with Law
	Frances Wilkinson	Bsc Hons Town and Regional Planning MRTPI
Chapter 6 **Landscape and Visual Impact**	Mark Swithenbank	CMLI, MA. Landscape, MSc. Environmental Resource Management
	Rohan Sinha	CMLI, MLA Landscape Architecture B.Arch (Hons) Architecture
Chapter 7 **Historic Environment**	Craig Stewart	MA Landscape BA Ancient History and Archaeology, PCIfA
	John Mabbitt	BA (Hons) Ancient and Modern History, University of Oxford 1996 MA Field Archaeology, York University 1999 PhD Historical Archaeology, Newcastle University 2012 Member of the Chartered Institute for Archaeologists (2007)
Chapter 8 **Ornithology**	Colin Ormston	BSc (Hons)
	Ian Simms	BSc (Hons)

Topic	Staff	Relevant expertise/qualifications
Chapter 9 Ecology	Alastair Miller	2002, MSc 2001, BSc (Hons), Zoology
	Glenn Richards	BSc (Hons), MRes. CEnv. MCIEEM
	Graham Burt-Smith	PhD, BSc (Hons), MCIEEM, CEnv
Chapter 10 Telecommunications and Aviation	Tim Doggett	BSc (Hons) Geography, MSc Environmental Sustainability
	Stewart Heald	Dip. Leadership and Management
Chapter 11 Geology Hydrology and Hydrogeology	Shaun Salmon	B.Sc. (Hons), M.Sc., Ph.D
	Steve Anderton	B.Sc. (Hons), M.Sc., Ph.D
Chapter 12 Noise	Matthew Stroud	BSc(Hons), MSc, AMIOA
	Mark Evans	BA(Hons), MSc, PDip, MIOA
Chapter 13 Traffic and Transport	Adrian Simms	2007, MSc, Spatial Planning, Oxford Brookes University 2004, BSc (Hons), Geography with Business Management, University of Gloucestershire
	Luke Ford	2014, BSc (Hons), Geography, University of Derby
Chapter 14 Socio Economics	Ryan Llewellyn	BA Hons Town Planning Dip TP MRTPI
	Frances Wilkinson	Bsc Hons Town and Regional Planning MRTPI
Chapter 15 Shadow Flicker	Tim Doggett	BSc (Hons) Geography, MSc Environmental Sustainability

1.4 Purpose of the Environmental Impact Assessment Report

1.4.1 This EIA Report has been prepared as it is acknowledged that the Proposed Development meets the criteria for EIA development under the EIA Regulations. It has been prepared to meet the requirements of the EIA Regulations and provides part of the information that will be used by the Scottish Ministers, and the Comhairle nan Eilean Siar (CnES) and other key stakeholders, to inform the process of determining the application for consent of the Proposed Development under section 36 of the Electricity Act 1989. Details about obtaining copies of the EIA Report are set out in **Section 1.9**.

1.4.2 A scoping request was made to the Scottish Ministers through the Energy Consents Unit in July 2018 (**Appendix 2A**), and a response ('scoping opinion') was received on 27 September 2018 (**Appendix 2B**).

1.4.3 In accordance with good practice, a scoping report was prepared to identify the potential likely significant environmental effects of the Proposed Development. Those effects that were assessed as being likely to be significant or where likely significant effects could not be discounted at the scoping stage were proposed for further assessment in the EIA Report. This reflects the requirement of the EIA Regulations for the EIA Report to focus on those effects that are likely to be significant.

1.4.4 This EIA Report has been based on the scoping opinion (**Appendix 2B**) and subsequent scoping and assessment work. It includes an assessment of the likely significant environmental effects of the Proposed Development, leading to a conclusion about which effects were assessed as being significant and identifying potential mitigation measures in respect of likely significant adverse effects.

1.4.5 The overall approach that has been taken to defining significance, as well as further information about the approach to preparing the EIA Report, are outlined in **Chapter 2** of this document.

1.4.6 As set out in Schedule 4 of the EIA Regulations, the following information should be included in an EIA Report:

- The location of the Proposed Development;
- The characteristics and land-use requirements of the Proposed Development, considering construction and operation (including requisite demolition works where relevant);
- Operational processes such as energy, materials and natural resources used;
- Any residues and emissions (such as water, air, soil and subsoil pollution, noise, vibration, light, heat, and quantities and types of waste produced during the construction and operation phases);
- The reasonable alternatives that the developer has studied, including an indication of the main reasons for the chosen option, with a comparison of their environmental effects;
- The baseline environment and its evolution (as far as natural changes to that baseline can be assessed with reasonable effort) in the absence of the Proposed Development;
- A description of the likely significant effects of the Proposed Development on environmental factors - population, human health, biodiversity, land, soil, water, air, climate, material assets, cultural heritage and landscape;
- A description of whether the above impacts are likely to be direct or indirect' secondary; cumulative; short, medium or long term; permanent or temporary or positive or negative in nature;
- A description of the methods used in the assessment to determine whether significant effects are likely to occur;
- A description of measures and monitoring that have been identified with the aim of addressing likely significant adverse effects;
- A description of any significant effects on the environment deriving from Proposed Development's vulnerability to major accidents and disasters;
- A non-technical summary;
- A list of references.

1.4.7 Regulation 4 and Schedule 4 of the EIA Regulations require that the environmental topics listed in column 1 of **Table 1.2** need to be considered when preparing an EIA Report. Column 2 then lists where these topics are included in this EIA Report, with reference to the relevant chapter numbers.

Table 1.2 Environmental Topics to be Addressed in the EIA Report and Chapter References

Topics[1] that need to be assessed under the EIA Regulations	Chapter titles where addressed in this EIA Report
Population	Landscape and visual impact (Chapter 6); Telecommunications and aviation (Chapter 10); traffic and transport (Chapter 13); noise (Chapter 12); and socio-economics and health (Chapter 14)
Human health	Telecoms and aviation infrastructure (Chapter 10). Noise (Chapter 12); traffic and transport (Chapter 13); socio-economics and health (Chapter 14); shadow flicker (Chapter 15);
Biodiversity	Ornithology (Chapter 8); terrestrial and aquatic ecology (Chapter 9).
Land	Geology, hydrology and hydrogeology (Chapter 11).
Soil	Geology, hydrology and hydrogeology (Chapter 11).
Water	Geology, hydrology and hydrogeology (Chapter 11).
Air	Scoped out (See Appendix 2A and 2B for the Stornoway Wind Farm Scoping Report, July 2018, and the Scoping Opinion).
Climate	Project Description (Chapter 4), Ecology (Chapter 9) Geology, hydrology and hydrogeology (Chapter 11) and socio-economic (Chapter 14).
Cultural heritage	Historic environment (Chapter 7).
Landscape	Landscape and visual impact (Chapter 6).
The inter-relationship between the above factors	Considered within each Chapter as relevant.
Vulnerability to major accidents or disasters	EIA Process (Chapter 2) and Scheme need, alternatives, iterative design process (Chapter 3) and Project Description (Chapter 4).

1.5 Structure of this Environmental Impact Assessment Report

1.5.1 The application submission comprises six volumes, the EIA Report containing the following four of these:

- **Volume 1** – A Non-Technical Summary (NTS), which is also available as a standalone document.
- **Volume 2** – The EIA Report (this volume) which is sub-divided into the following chapters.
  - Chapter 1 - introduction to the EIA report (this chapter);
  - Chapter 2 - details the approach that has been adopted in preparing the EIA Report;
  - Chapter 3 - explains the need for the Stornoway Wind Farm, outlines the main alternatives considered for meeting this need and describes the design process for the Proposed Development;
  - Chapter 4 - provides the Project Description of the Proposed Development;

[1] In this EIA Report, the word 'topic' is used when referring to the environment that could be affected by the proposed development. Other words with the same general meaning are used in the EIA Regulations, notably 'factor' and 'aspect', but these are not used in the same context within this EIA Report.

  - Chapter 5 - provides an overview of the legislation and policies that are relevant to the EIA Report;
  - Chapters 6 to 15 - these set out the technical assessments for the environmental topics that need to be considered in the EIA Report;
  - Chapter 16 - provides a summary of mitigation measures identified in **Chapters 6** to **15**.
- **Volume 3** contains the figures referred to in the EIA Report.
- **Volume 4** contains the appendices referred to in the EIA Report.

1.5.2 A glossary of technical terms is provided as **Appendix 1A** in **Volume 4** of the EIA Report.

1.6 Other Documents

1.6.1 The application for the Proposed Development is informed by the EIA Report, but also by other documents, the contents of at least some of which are of direct relevance to the findings of the EIA Report. The latter reports, which are listed below, are therefore included.

- **Volume 5** is the planning statement that accompanies the application submission;
- **Volume 6** is the Pre-Application Consultation (PAC) Report that accompanies the application submission.

1.7 The Project Developer

1.7.1 Stornoway Wind Farm Limited (SWL) is a subsidiary of Lewis Wind Power Holdings Limited (LWP), which is a joint venture between EDF Renewables Ltd and Amec Project Investments Ltd in partnership with the Stornoway Trust.

1.7.2 The Site is owned by the Stornoway Trust, a community owned charitable trust established in 1923, with responsibility for an area covering some 28,000ha. The population within the Stornoway Trust landholding is approximately 12,000, with 45 crofting townships and some 1,347 crofters within the population. The Stornoway Trust has been a long-standing supporter of the development of a renewable energy industry in the Western Isles and over the past ten years has explored a range of options to stimulate renewable energy projects on its land.

1.8 Community Engagement

1.8.1 The Applicant undertook extensive consultation and engagement at the pre-application stage with a range of statutory and non-statutory consultees, local communities, organisations and individuals. A PAC Report has been prepared which forms part of the application submission (**Volume 6**).

1.9 Obtaining Further Information

1.9.1 The EIA Report and supporting documentation are available online at the following dedicated project website for the Proposed Development:

https://lwp.scot/

1.9.2 Copies of the NTS and DVD copies of the application submission are available free of charge when requested in writing. Paper copies of the entire application submissions may be obtained at a cost of £1,000 including postage and packaging whilst stocks last. To request a copy of the application submission please contact:

Sue Birnie at:

sue.birnie@woodplc.com or Wood, Floor 7 Partnership House, Regent Farm Road, Gosforth NE3 3AF.

1.9.3 Hard copies of the documentation for the application and EIA Report will also be made available for public viewing at:

- Scottish Government Library at Victoria Quay, Edinburgh, EH6 6QQ;
- Comhairle nan Eilean Siar Council Offices, Sandwick Road, Stornoway, Isle of Lewis, HS1 2BW;
- Stornoway Library, 19 Cromwell Street, Stornoway, Isle of Lewis, HS1 2DA;
- Lewis Wind Power, 9 Harbour View, Cromwell Street Quay, Stornoway, HS1 2DF.

2. Approach to Preparing the Environmental Impact Assessment Report

2.1 The Environmental Impact Assessment Process

2.1.1 The preparation of the EIA Report is one of the key stages in the EIA process, as it brings together information about any significant environmental effects, which the decision makers will use to inform their decision about whether the Proposed Development should be allowed to proceed.

Overview of EIA

2.1.2 This chapter sets out the EIA process, the relevant regulations, guidance, terminology, methodology, scoping process and the requirement for the consideration of alternatives (also see **Chapter 3: Scheme need, alternatives and iterative design process**). The chapter then explains in more detail the particular scope of this EIA.

2.1.3 EIA is a systematic procedure that must be followed for certain categories of project, which aims to identify a project's likely significant environmental effects, identify mitigation measures to reduce or offset the level of adverse effects and finally to assess residual effects with these measures incorporated or applied. This process helps to ensure that the predicted likely significant effects and the scope for any mitigation of these effects are properly understood by the public, and by the determining authority (in this instance, the Scottish Ministers) before it decides on whether consent should be granted.

2.1.4 Information on the Proposed Development and its environmental effects are presented within an EIA Report. Regulation 4 of the EIA Regulations[1] sets out that EIA is a process consisting of:

"(a) The preparation of an EIA report by the developer;

(b) The carrying out of consultation, publication and notification as required by Parts 5 and 6 and, where relevant Part 10;

(c) The examination by the Scottish ministers of the information presented in the EIA report and any other environmental information;

(d) The reasoned conclusion by the Scottish Ministers on the significant effects of the development on the environment, taking into account the results of the examination referred to in sub-paragraph (c) and, where appropriate, their own supplementary examination; and

(e) The integration of the Scottish Ministers' reasoned conclusion into the decision notice in accordance with regulation 21".

2.1.5 A robust EIA is defined by a number of characteristics:

- It is systematic, comprising a sequence of tasks defined both by regulation and by good practice;
- It is analytical, requiring the application of specialist skills from the environmental sciences;
- It is impartial, its objective being to inform decision-making rather than to promote the project;

[1] The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended).

- It is consultative, with provision being made for obtaining information and feedback from interested parties including local authorities, members of the public and statutory and non-statutory agencies; and
- It is iterative, allowing opportunities for environmental concerns to be addressed during the planning and design of a project.

2.1.6 The EIA process identifies the potential for effects to arise and identifies environmental measures (mitigation) to be incorporated into the design of the Proposed Development, or the method of construction and operation that may reduce or eliminate negative effects or enhance positive effects. Typically, numerous design iterations take place in response to environmental constraints identified during the EIA process (in effect, incorporating mitigation measures to avoid, reduce or compensate for identified adverse effects). Further details of such measures identified for the Proposed Development are presented in **Chapter 3**, and the corresponding environmental topic chapters.

Need for EIA

2.1.7 Under section 36 of the Electricity Act 1989, consent is required from the Scottish Ministers for the construction and operation of all power generating plant that would have an installed capacity of more than 50MW.

2.1.8 The EIA Regulations apply to section 36 applications and the Proposed Development falls within Schedule 2, being a generating station the construction of which (or the operation of which) will require a section 36 consent but which is not a Schedule 1 development as defined therein. As noted in **Chapter 1: Introduction** of this EIA Report, Schedule 2 development constitutes EIA development if the development is likely to have significant effects on the environment by virtue of factors such as its nature, size or location. Wind farms of the scale proposed generally give rise to some significant environmental impacts. However, it should be noted that a significant effect is not necessarily an unacceptable one when weighed against the benefits in the overall balance of acceptability of a scheme. This balance is set out in the **Planning Statement** which accompanies the application submission.

EIA Regulations

2.1.9 Schedule 4 of the EIA Regulations specifies that the EIA Report should describe those factors likely to be significantly affected by the Proposed Development: population, human health, biodiversity, land (for example land take), soil (e.g. organic matter, erosion, compaction, sealing), water, air, climate (e.g. greenhouse gas emissions), material assets, cultural heritage (including architectural and archaeological aspects), and landscape.

2.1.10 Establishing which aspects of the environment and associated issues are relevant for a particular project can be captured in an EIA scoping process. The proposed scope of the assessment is provided to the determining authority by an applicant, and the determining authority provides its opinion on the scope, taking account of feedback it obtains from key consultees. The scoping exercise undertaken for the Proposed Development is described below and a copy of the scoping report and opinion are set out in **Appendix 2A** and **2B** respectively.

EIA Guidance

2.1.11 A range of reference material and guidance has been drawn upon in developing the EIA methodology adopted for the Proposed Development. Principal sources of reference material and guidance over and above the EIA Regulations are noted in each environmental topic chapter and, depending on topic area, may include:

- Environmental Impact Assessment Guide to: Delivering Quality Development (July 2016);
- Environmental Impact Assessment Handbook, Guidance for competent authorities, consultation bodies, and others involved in the Environmental Impact Assessment process in Scotland, SNH, April 2018;
- Guidelines for Landscape and Visual Impact Assessment 3rd Edition (April 2013);
- Online Renewables Planning Advice: Onshore Wind Turbines (Scottish Government, updated May 2014);
- Scottish Executive Development Department PAN 1 /2011 (March 2011) Planning and Noise;
- Scottish Executive Development Department PAN 2 /2011 (July 2011) Planning and Archaeology;
- Scottish Executive Development Department PAN 3 /2010 (August 2010) Community Engagement;
- Scottish Executive Development Department PAN 51 (Revised 2006) Planning, Environmental Protection and Regulation;
- Scottish Executive Development Department PAN 60 (updated January 2008) Planning for Natural Heritage;
- Scottish Executive Development Department PAN 61 (July 2001) Planning and Sustainable Urban Drainage Systems;
- Scottish Executive Development Department PAN 75 (August 2005) Planning for Transport;
- Scottish Executive Development Department PAN 79 (September 2006) Water and Drainage;
- Scottish Government Planning Circular 1/2017: Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017;
- Outer Hebrides Local Development Plan (adopted 2018) and Supplementary Planning Guidance.

2.2 EIA Terminology

Impacts and Effects

2.2.1 In some EIA Reports, the terms 'impacts' and 'effects' are used interchangeably, whilst in others the terms are given different meanings. Some use ‘impact’ to mean the cause of an ‘effect’, whilst others use the converse meaning. This variety of definitions has led to a great deal of confusion over the terms, both among the authors and the readers of EIA Reports.

2.2.2 The convention used in this EIA Report is to use 'impacts' only within the context of the term EIA, which describes the process from scoping through EIA Report preparation to subsequent monitoring and other work. Otherwise, this document uses the word 'effects' when describing the environmental consequences of the Proposed Development. For example, such effects may come about as a result of the following:

- Physical activities that would take place if the development were to proceed (e.g. vehicle movements during construction operations);

- Environmental changes that are predicted to occur as a result of these activities (e.g. loss of vegetation prior to the start of construction work or an increase in noise levels). In some cases, one change causes another change, which in turn results in an environmental effect.

2.2.3 The predicted environmental effects are the consequences of the environmental changes for specific environmental receptors. For example, with respect to bats, the loss of roosting sites or foraging areas could affect the bats' population size; with regard to people, an increase in noise levels could affect people's amenity.

2.2.4 This EIA Report is concerned with assessing the significance of the environmental effects of the Proposed Development, rather than the activities or changes that cause them. However, this requires these activities to be understood and the resultant changes identified and quantified, often based on predictive assessment work.

Spatial and Temporal Scope

2.2.5 Spatial scope is the area over which changes to the environment are predicted to occur as a consequence of the Proposed Development. In practice, an EIA should focus on those areas where these effects are likely to be significant.

2.2.6 In this EIA Report, the spatial scope varies between environmental topics and is therefore described in each of the topic chapters. For example, the effects of a development with respect to landscape and visual amenity would generally be expected to cover a much greater area than biodiversity related effects which are often more localised.

2.2.7 The temporal scope covers the time period over which changes to the environment and the resultant effects are predicted to occur, and are typically defined as either being temporary or permanent.

2.3 EIA Scoping

2.3.1 Regulation 5(3) of the EIA Regulations requires that, where a scoping opinion has been adopted, "*the EIA report must be based on that scoping opinion and must include the information that may reasonably be required for reaching a reasoned conclusion on the significant effects of the development on the environment, taking into account current knowledge and methods of assessment*". This effectively allows the determining authority to control the scope of the assessment. As such, it is important to set out as much information as possible about the development and the proposed work scope when preparing a scoping report with the objective of achieving a scoping opinion or direction that ideally does not require amendment.

2.3.2 Scoping involves identifying the following:

- The people and environmental resources (collectively known as 'receptors') that could be significantly affected by the Proposed Development;
- The work required to take forward the assessment of these potentially significant effects.

2.3.3 Scoping starts at the outset of the EIA process, with the initial identification of potentially significant effects as a result of the Proposed Development being set out in a scoping report (**Appendix 2A**). The preparation of the scoping report is informed by information about the legislative and policy context to the scheme. It is also informed by the simple rule that, to be significant, an effect must be of sufficient importance that it should influence the process of decision-making about whether or not consent should be granted for the Proposed Development or an element of it. In this EIA Report, this is referred to as the 'significance threshold.

2.3.4 At the scoping report stage, the conclusion that is made using the significance threshold is based upon professional judgement, with reference to the project description at that stage, and available information about:

- The magnitude and other characteristics of the potential changes that are expected to be caused by the Proposed Development;
- The sensitivity of receptors to these changes;
- The effects of these changes on relevant receptors;
- The value of receptors.

2.3.5 As a precautionary approach if the information that is available at the scoping report stage does not enable a robust conclusion to be reached that a potential effect is not likely to be significant, the effect is taken forward for further assessment.

2.3.6 The scoping report for the Proposed Development was submitted for comment to the competent determining authority and others in July 2018.

2.3.7 The environmental topic Chapters (6-15) of this EIA Report detail the final scope of the assessment, with effects that are not referred to being unlikely to be significant. Some effects that would normally be scoped-out because they are not likely to be significant have been scoped-in on the basis that it may not be clear why this is the case without further explanation being provided (i.e. Chapter 13: Traffic and Transport).

2.3.8 The scoping report for the Proposed Development (**Appendix 2A**) was submitted to the Energy Consents Unit (ECU) for comment as the competent determining authority and others. The scoping report set out that the following environmental topics were proposed to be scoped into the EIA Report:

- Landscape and Visual;
- Historic Environment;
- Ornithology;
- Terrestrial and aquatic Ecology;
- Geology, Hydrogeology and Hydrology;
- Traffic and Transport;
- Noise;
- Socio-economics, Tourism and Recreation;
- Shadow Flicker;
- Human Health; and
- Major Accidents and Disasters.

2.3.9 The Scoping report, and the subsequent Scoping Opinion comprised a scheme of 33 turbines to a maximum height of 187m (24 turbines up to 187m and 9 up to 155m). Since that time, and taking account of comments received from the scoping exercise and other consultation events (see (Pre-Application Consultation Report (PAC) **PAC Report** (**Volume 6**), the Proposed Development has evolved. This evolution is set out in Chapter 3, and the Proposed Development now comprises 35 turbines up to 185m in height (25 turbines up to 80m in height, and 10 turbines up to 156m in height). The change in the design envelope is minor in nature, and would not result in additional or new significant impacts in addition to those already identified and assessed as part of the EIA for the Proposed Development. Both the Scottish Ministers and CnES have been contacted (see **Appendix 2C**) to confirm that the minor change in the EIA design envelope complies with the Scoping Opinion (**Appendix 2B**). Further details on topic specific consultation with consultees is set out in the relevant technical chapters.

Human Health and Major Accidents and Disasters

Human Health

2.3.10 'Human Health' and 'Major Accidents and Disasters' are 'new' topics under the EIA Regulations, though some elements of these were considered in EIAs pre-dating the update to these under other technical topics. As set out in the scoping report, human health topics are considered within relevant technical chapters including:

- **Chapter 6: Landscape and Visual;**
- **Chapter 10: Telecommunications and aviation;**
- **Chapter 11: Geology, Hydrology, Hydrogeology;**
- **Chapter 12: Noise;**
- **Chapter 13 Traffic and Transport**;
- **Chapter 14: Socio-Economics; and**
- **Chapter 15: Shadow Flicker.**

Major Accidents and Disasters

2.3.11 The scope for this EIA to consider the vulnerability of the Proposed Development to major accidents and disasters has been considered in Table 15.1 of the scoping report (**Appendix 2A**). Major accidents or disasters have been scoped in where they represent a risk to or because of the Proposed Development, either from the proposed location or from the project itself and where there is reasonable likelihood of the accident or disaster occurring, or where the effect of the accident or disaster would lead to mitigation which is beyond the usual scope of construction or operational activities. Where an accident or disaster has been scoped in, the EIA Report chapter(s) identified consider the matter in more detail, and therefore no specific chapter on major accidents and disasters is included. The following topic areas are scoped into the assessment in the relevant chapters as set out below:

- **Chapter 3** and **Appendix 9.H Peat management Plan** (Peat slide risk assessment): Landslide / subsidence Peat and bog ground conditions are susceptible to landslide. Wind farm construction can trigger an event;
- **Chapter 3**: Severe weather: storms - The Development Site is located in an area that receives regular storm conditions;
- **Chapter 3**: Severe weather: extreme temperatures – There is the potential for damage to turbines or infrastructure from severe weather. Severe cold weather could lead to ice build-up on blades. Ice build-up could lead to ice throw, or to blade damage;
- **Chapter 3** and **Chapter 11**: Floods - Land around watercourses on site is within identified flood zones. There is the potential to damage turbines or infrastructure as a result of flooding, or increase in flood risk elsewhere from development in flood zones;

- **Chapter 3** and **Chapter 13**: Transport accidents - Abnormal loads and increase in traffic from construction works could lead to an increased risk of accidents. Highway network may be unsuitable for such traffic, further increasing accident risk;
- **Chapter 3** and **Chapter 10**: Electricity, gas, water supply or sewerage system failures – The Development Site contains electricity and other infrastructure such as telecom links. The construction activities or possible turbine collapse could damage electricity infrastructure.

Consideration of Alternatives

2.3.12 The EIA Regulations require the EIA Report to include "*A description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects*."

2.3.13 National planning and energy policy makes it clear that there is no requirement for renewable energy developments to demonstrate an overall need for new renewable energy generation or a need to justify them being in a specific location (with the effects as a result of development in a specific location being covered by the EIA to ascertain acceptability in that location). Notwithstanding this, there is currently a section 36 consent (the Consented Development) at the Development Site. Therefore in principle, the Proposed Development is appropriately located. **Chapter 3** describes the Development Site identification process and design criteria, including the technology, size and scale of a wind farm. In EIA terms, the requirement is only to report on reasonable alternatives that have been considered. The examination of alternatives in this EIA Report is therefore restricted as appropriate to alternative designs that were considered for the Development Site.

Scoping Opinion

2.3.14 The scoping opinion is included as **Appendix 2B** together with the scoping responses. Details on how the scoping responses are addressed in the EIA are summarised in the Gatecheck report (**Appendix 2D)**.

2.3.15 The process of completing topic specific investigations inherently involves further surveys and assessments and discussions with consultees. Topic specific refinements were made as a result of these activities. These are set out in the Gatecheck report issued to the ECU in April 2019 for agreement, and included in **Appendix 2D**.

2.4 Consultation

2.4.1 Consultation is an essential element of the EIA process and is reported within the EIA Report and in the additional documentation **PAC Report Volume 6**). The Applicant is committed to promoting dialogue with statutory and non-statutory consultees and the local community. The following statutory consultees, non-statutory consultees and interested parties were notified of the Proposed Development though the Scoping Report and will be notified again upon submission of the EIA:

Statutory Consultees:

- Comhairle nan Eilean Siar;
- SNH;

- Joint Radio Company;
- RSPB Scotland;
- Mountaineering Council of Scotland;

- SEPA; and
- Historic Environment Scotland.

Non-Statutory Consultees:

- Scottish Water;
- Marine Scotland;
- Fisheries Management Scotland;
- Highlands and Islands Airport Limited (HIAL);
- Forestry Commission Scotland;
- Marine Scotland;
- Transport Scotland;
- Association of Salmon Fisheries Board;
- BT;
- Civil Aviation Authority – Airspace;
- The Crown Estate;
- Defence Infrastructure Organisation;
- NATS Safeguarding;
- Scottish Water;
- John Muir Trust;
- Scottish Wildlife Trust;
- Nuclear Safety Directorate;
- British Horse Society;
- Scottish Rights of Way and Access Society (ScotWays);
- Visit Scotland;
- OFCOM;
- Stornoway Angling Association;
- Garden History Society of Scotland;
- Airwave Solutions;
- Arqiva;
- Outer Hebrides Fisheries Trust;
- Western Isles District Salmon Fisheries Board; and
- Western Isles Tourist Board.

2.4.2 In addition, the following interested parties were notified:

- North Lochs Community Council;
- Kinloch Community Council;
- Point Community Council;
- Sandwick Community Council;
- Tong Community Council;
- Pairc Community Council.

2.5 Overview of Assessment Methodology

Introduction

2.5.1 All the topic assessments presented in the EIA Report have been undertaken on the basis of a common understanding of the nature of the project, as described in **Chapter 4: Project Description**.

2.5.2 For each technical chapter **(Chapter 6-15**), the assessment of likely significant effects has been undertaken by competent experts with relevant specialist skills (See **Table 1.1**), drawing on their experience of working on other development projects, good practice in EIA and on relevant published information in line with Regulation 5(5)[2]. For some topics, use has been made of modelling or other methodologies, as appropriate.

2.5.3 Regulation 5(4)[3] sets out "*With a view to avoiding duplication of assessments, account is to be taken of the available results of other relevant assessments in preparing the EIA report*". With a few exceptions, each topic chapter follows a common format, as outlined below:

- A non-technical summary;
- Introduction;
- Limitations of the assessment;
- Legislative and policy context;
- Data gathering methodology;
- Overall baseline (where appropriate), with the detailed baseline being set out within 'Assessment of effects';
- Scope of the assessment;
- Environmental measures embedded into the scheme;
- Assessment methodology;
- Assessment of effects;
- Assessment of cumulative effects;
- Additional mitigation;
- Conclusions of significance evaluation;
- References.

2.5.4 The exceptions to this structure are where only a limited amount of assessment work was necessary to demonstrate that effects would not be significant (i.e. all effects under a particular topic are 'scoped-out'), e.g. **Chapter 15**. In such situations, mitigation is not required.

General EIA Methodology

2.5.5 Following the identification of the scope of the EIA, individual environmental topics are subject to survey, investigation and assessment, and individual topic chapters are prepared for the EIA Report. The assessment methodologies are based on recognised good practice and guidelines specific to each topic area, details of which are provided in the appropriate chapter.

2.5.6 In general terms, the technical studies undertaken for each topic area and chapter include:

- Collection and collation of existing baseline information about the receiving environment and original surveys to fill any gaps in knowledge or to update any historic information, together with identification of any relevant trends in, or evolution of, the baseline;
- Consultation with experts and relevant consultees to define the scope of the assessment and study area and subsequent consultation in response to emerging study findings;

[2] The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017.

[3] The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017.

- Consideration of the potential effects of the Proposed Development on the baseline, followed by identification of design changes to seek to avoid or reduce any predicted adverse effects;
- Engagement with other technical topic specialists and engineers / designers in a design iteration process seeking to optimise the scheme for the differing environmental effects and to identify any appropriate mitigation measures;
- Assessment of the final scheme design and evaluation of significant effects, together with an evaluation of any residual significant effects that remain after mitigation measures have been implemented; and
- Compilation of the EIA Report chapter (see **Section 1.4**) for the general format of the environmental topic chapters).

2.5.7 Many of the changes as a result of the Proposed Development are relevant to more than one environmental topic area and the resulting effects in one topic area may affect receptors considered under another topic (for example change to water quality may affect aquatic biodiversity receptors). Careful attention has therefore been paid to interrelationships to avoid overlap or duplication between topic chapters. For example, the assessment of effects on cultural heritage features will be aided by the assessment in the landscape and visual chapter. Similarly, secondary effects on ecological resources arising from hydrological change will be considered in the ecology chapter with a cross-reference to the relevant direct effect in the hydrology chapter.

2.5.8 In some cases, technical data and analysis is presented in a technical appendix (these are included in **Volume 4** of this EIA Report). It is also necessary to recognise that information on some topics, such as the nesting location of certain bird species, is highly sensitive and may create a risk of persecution if published. In those cases, all relevant information to inform the assessment process has been provided to relevant statutory consultees only. The Applicant will consider requests for this information from other parties, but may, at its or relevant statutory consultees' discretion, withhold such information.

2.6 Identification of Baseline Conditions

2.6.1 In order to assess the effects of construction, operation and decommissioning, it is necessary to determine the periods in the project programme when these 'stages' or 'phases' would occur, and when a reasonable 'worst case' of these stages/phases can be defined for use in the assessment.

2.6.2 As the various elements of the Proposed Development are expected be built over a period of 30 months, currently estimated to start in 2022, and then operated for 25 years, it cannot be assumed that the baseline conditions in the absence of the project would be the same as the current baseline throughout this period.

2.6.3 As required by Schedule 4 Regulation 3[4] *"a description of the relevant aspects of the current state of the environment (the "baseline scenario")….."*, it is necessary to define the current baseline conditions and then to decide whether these conditions are likely to change by the 'assessment years' that are selected for the construction and operation of the Proposed Development. If this predicted future baseline is more likely to occur than the current baseline it is used for the assessment. However, in many cases it will be concluded that the current baseline is just as likely, or even more likely, to occur in the assessment years than would be the case with any predicted future baseline conditions. In the case of this EIA, the current baseline is used for the assessment as, in the absence of the Proposed Development, it is anticipated that current land use and management

[4] The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017.

would continue and it is therefore reasonable to assume that the future baseline would be similar to the current baseline.

2.6.4 In addition, Schedule 4 Regulation 3 goes on to state that *"… an outline of the likely evolution thereof without implementation of the project as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of relevant information and scientific knowledge*". This part of the regulation is looking at a "do nothing" scenario for comparative purposes. It is how the baseline might develop over the period of the development in a scenario where the project does not proceed.

2.6.5 Each technical chapter explains the basis for defining the baseline conditions and the do nothing scenario, where this is appropriate, based on the following:

- Information gathered about the existing environmental conditions;
- Changes that can be predicted based on reasonable assumptions and modelling calculations, e.g. the application of traffic growth factors based on relevant guidance;
- Information relating to other likely and predictable changes, e.g. climate change, which could affect current prevailing environmental conditions;
- Information about other relevant developments, including the nature of the development proposals, their likely timing and their location relative to the Proposed Development.

2.6.6 The baseline is determined for the *'Study Area'* for each environmental topic by a combination of desk-based research, including consultation with the relevant statutory and non-statutory authorities, together with field survey work (where required).

2.6.7 As a minimum, the Study Area could comprise the Development Site. However, for many developments, the Study Area is also likely to include land outside the Development Site boundary, especially where the effects of the Proposed Development are likely to extend beyond such geographical limits. Where the Proposed Development could affect off-site areas, the Study Area reflects the *'zones of influence'* (ZoI) where effects may occur.

2.6.8 Details of the relevant ZoIs are discussed in the baseline section of each environmental topic chapter.

2.7 Overview to Approach to Significance Evaluation Methodology

Introduction

2.7.1 One of the requirements of an EIA Report is to set out the conclusions that have been reached about the likely significant environmental effects that it is predicted will result from a proposed development. Reaching a conclusion about which effects, if any, are likely to be significant is the culmination of an iterative process that involves the following stages:

- Identifying those effects that are likely to be significant (see **Section 2.3** on scoping);
- Assessing the effects of the Proposed Development against the baseline (current or future, as appropriate);
- Concluding whether these resultant effects are likely to be significant.

2.7.2 **Chapters 6 to 15** describe the approaches that have been used in relation to the stages outlined in the bullet points above for each of the environmental topics that are considered in this EIA Report.

Identification of Likely Significant Effects

2.7.3 To inform the identification of likely significant effects, technical specialists involved in the preparation of the EIA Report were supplied with information about the construction, operation and decommissioning of the Proposed Development at an early stage of the assessment process.

2.7.4 As the proposals evolved, more detail became available about construction and operational activities. This enabled a progressively more refined understanding to be developed about the environmental changes that could be caused by the Proposed Development, including information about their spatial extent and other characteristics (e.g. their magnitude, frequency etc.).

2.7.5 The identification of receptors that need to be considered draws on available information about environmental changes, which in some cases can be translated into ZoIs outside of which the environmental changes are predicted to be sufficiently small that receptors are not likely to be significantly affected. In addition, for some environmental topics (e.g. biodiversity and historic environment), a valuation is undertaken to define those receptors that are of sufficient importance or value that they could be significantly affected. Only those receptors that are of sufficient importance or value and that are located within the defined ZoIs where effects could be significant, are taken forward for further assessment.

2.7.6 The technical assessments, undertaken in **Chapters 6 to 15** of this EIA Report, describe how environmental changes and resulting effects for different environmental topics are assessed, together with the topic specific approaches that have been used to identify the receptors that could be significantly affected by the Proposed Development.

Types of Effects

2.7.7 Paragraph 5 of Schedule 4 of the EIA Regulations states that *"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."* Where appropriate, this EIA Report considers all these types of effects where they are relevant to different environmental topic chapters.

Direct Effects

2.7.8 Direct effects are those that result directly from a Proposed Development. For example, where a machine disturbs an area of habitat, the associated physical activity would result in a change to that habitat.

Indirect and Secondary Effects

2.7.9 Indirect and secondary effects are those that result from consequential change caused by the development. As such they would normally occur on a different receptor, later in time or at locations farther away than direct effects. An example would be where an area of habitat disturbed by machinery results in loss of vegetation and soil compaction which increases silted run-off rates into nearby watercourses, smothering gravel beds downstream used by spawning salmon.

Transboundary Effects

2.7.10 Transboundary effects are those that would affect the environment in another state within the European Economic Area (EEA).

Temporal Effects

2.7.11 As discussed in **Section 2.2**, temporal effects are typically defined as being permanent or temporary as follows:

- Permanent - these are effects that will remain even when the Proposed Development is complete, although these effects may be caused by environmental changes that are permanent or temporary. For example, an excavator that is temporarily driven over an area of valuable habitat could cause so much damage that the effect on this vegetation would be permanent;
- Temporary – these are effects that are related to environmental changes associated with a particular activity and that will cease when that activity finishes. For example, an increase in noise levels during construction may affect nearby residential receptors, but any effects would cease on completion of this phase of a proposed development. Where effects are temporary, they may be defined as short-, medium- and long-term, the duration of which may depend on the receptor in question and would therefore be defined in technical chapters as appropriate.

Positive / Negative Effects

2.7.12 Most predicted effects will be obviously positive or negative and will be described as such. However, in some cases it is appropriate to identify that the interpretation of a change is a matter of professional opinion, and such effects will be described as 'subjective'.

Stages of Development

2.7.13 Effects from Wind farm development are generally considered in relation to the following key stages of the Proposed Development and it is unlikely that there would be an interaction and therefore cumulative effect between the phases (i.e. construction phase must complete before operation phase would take place):

- Construction – Effects may arise from the construction activities themselves, or from the temporary occupation of land. Effects are often of limited duration although there is potential for permanent effects. Where construction activities create permanent change, the effects will continue into the operational period;
- Operation – Effects may be permanent, or they may be temporary, intermittent, or limited to the life of the Proposed Development until decommissioning (as in the case of wind power developments which gain planning permission for a defined and finite number of years); and
- Decommissioning – Effects may arise from the decommissioning activities themselves, or from the temporary occupation of land. The effects would generally be temporary and of limited duration. Additional permanent change would normally be unlikely unless associated with restoration.

Significance Evaluation

Overview

2.7.14 The receptors that could be significantly affected are identified within each topic chapter. The approach that is adopted to determine whether the effects on these receptors are significant is to apply a combination of professional judgement and a topic-specific significance evaluation methodology that draws on the results of the assessment work that has been carried out.

2.7.15 In applying this approach to significance evaluation, it is necessary to ensure that there is consistency between each environmental topic in the level at which effects are considered to be significant. Therefore, it is inappropriate for the assessment of one topic to conclude that minor effects are significant, when, for another topic, only comparatively major effects are significant.

2.7.16 In order to achieve the desired level of consistency, each environmental topic lead has been guided in their decision-making about likely significance by the *'significance threshold'* that informed the preparation of the scoping report (see **Section 2.3**), as well as the relevant topic-specific significance evaluation methodology.

2.7.17 The conclusion about significance is arrived at using professional judgement, with reference to the project description, and available information. This information includes the magnitude and other characteristics of the potential changes that are expected to be caused by the Proposed Development, receptors' sensitivity to these changes and the effects of these changes on relevant receptors.

2.7.18 In some cases, use of the 'significance threshold' alone will enable a conclusion to be reached in the 'Scope of the assessment' section of the topic chapter (bullet point 6 in **Section 2.5.3**), without the need for more detailed assessment, that a potential effect is not likely to be significant. However, in other cases, effects identified in the 'Scope of the assessment' section are taken forward for further assessment in the subsequent section(s) of each topic chapter.

2.7.19 For some of these effects, relatively little assessment work may be required to reach a conclusion that an effect is not significant. But, in other cases, more extensive assessment work is required. Sometimes the application of the 'significance threshold' is sufficient to support this conclusion but, in other cases, the relevant topic-specific significance evaluation methodology is used to inform the evaluation of significance (to determine whether an effect is or is not significant).

2.7.20 Having applied the relevant topic-specific significance evaluation methodology, the topic specialists check the conclusions against the significance threshold. If this threshold results in a different conclusion to that reached using the significance evaluation methodology, a detailed justification is provided as to why this different conclusion is valid.

2.7.21 For some of the topics that are assessed in the EIA Report, there is published guidance available about significance evaluation. Where such guidance exists, it has been used to inform the development of the significance evaluation methodologies that are used in this EIA Report. For other topics, it has been necessary to develop methodologies without the benefit of guidance. This has involved technical specialists drawing on their previous experience of significance evaluation in EIA.

2.7.22 While there may be variation depending on the technical topic being considered, significance evaluation involves combining information about the sensitivity, importance or value of a receptor, and the magnitude and other characteristics of the changes that affect the receptor. The approach to using this information for significance evaluation is outlined below.

Receptor Sensitivity, Importance, or Value

2.7.23 The sensitivity or value of a receptor is largely a product of the importance of an asset, as informed by legislation and policy, and as qualified by professional judgement. For example, receptors for landscape, biodiversity or the historic environment may be defined as being of international or national importance. Lower value resources may be defined as being sensitive or important at a county or district level. For each environmental topic, it is necessary to provide a detailed rationale that explains how the categories of sensitivity/importance/value have been used.

2.7.24 The use of a location or physical element that may be representative of receptors, e.g. people, would also play a part in its classification in terms of sensitivity, importance, or value. For example, when considering effects on the amenity of people, a location used for recreational purposes may be valued more than a place of work.

Magnitude of Change

2.7.25 The magnitude of change affecting a receptor as a result of the Proposed Development would be identified on a scale from very low to very high. As with receptor sensitivity and value, a rationale is provided in each topic chapter that explains how the categories of environmental change are defined. For certain topics, the magnitude of change would be related to guidance on what levels of change are acceptable (e.g. for air quality or noise), and be based on numerical parameters. For other changes, it will be a matter of professional judgement to determine the magnitude of change, using descriptive terms.

Determination of Significance

2.7.26 The significance of effects is determined with reference to information about the nature of the development, the receptors that could be significantly affected and their sensitivity, importance or value, together with the magnitudes of environmental change that are likely to occur.

2.7.27 Significance evaluation for many environmental topics can be guided by the use of matrices that combine sensitivity/value and the characteristics of environmental changes as shown in the example in **Table 2.2** which is a five by five matrix used to offer granularity (though individual topic chapters may use reduced versions (e.g. four by four, four by three etc.) as appropriate). In addition, professional judgement is applied because, for certain environmental topics, the lines between the sensitivities or magnitudes of change may not be clearly defined and the resulting assessment conclusions may need clarifying.

2.7.28 Variations to this approach, which may be applicable to specific environmental topics, will be detailed in the relevant 'Significance evaluation methodology' sub-section contained in each environmental topic chapter.

2.7.29 Definitions of how the categories that are used in the matrix are derived for each topic are also set out in each environmental topic chapter, along with the relevant explanation and descriptions of receptor sensitivity, magnitude of change and levels of effect that are considered significant under the EIA Regulations.

2.7.30 Within the matrix that is used in most significance evaluation exercises, reference is made to:

- Major effects, which will always be determined as being significant in EIA terms;
- Moderate effects are likely to be significant, although there may be circumstances where such effects are considered not significant on the basis of professional judgement;
- Minor or negligible effects, which will always be determined as not significant.

Table 2.1 Significance Evaluation Matrix

Sensitivity/importance/value	Magnitude of change: Very high	High	Medium	Low	Very low
Very high	Major (Significant)	Major (Significant)	Major (Significant)	Major (Significant)	Moderate (Probably significant)
High	Major (Significant)	Major (Significant)	Major (Significant)	Moderate (Probably significant)	Minor (Not significant)
Medium	Major (Significant)	Major (Significant)	Moderate (Probably significant)	Minor (Not significant)	Negligible (Not significant)
Low	Major (Significant)	Moderate (Probably significant)	Minor (Not significant)	Negligible (Not significant)	Negligible (Not significant)
Very Low	Moderate (Probably significant)	Minor (Not significant)	Negligible (Not significant)	Negligible (Not significant)	Negligible (Not significant)

Note: Significant effects are those identified as 'Major'. 'Moderate' effects would normally be deemed to be significant. However, there may be some exceptions, depending on the environmental topic and the application of professional judgment.

2.8 Assessment of Cumulative Effects

2.8.1 For each environmental topic that is dealt with in this EIA Report, an assessment is undertaken of how the environmental effects resulting from the Proposed Development, could combine with the same topic-related effects generated by other developments to affect a common receptor. To do this, it is important to first identify which other developments need to be included in the Cumulative Effects Assessment (CEA) under each environmental topic assessment. The starting point for this is to determine the ZoIs from the Proposed Development for each receptor that could be significantly affected under each environmental topic under consideration.

2.8.2 Identifying other developments that should be considered in the CEA involves first acknowledging that the availability of information necessary to conduct this will partly depend on the prevailing status of the relevant other developments. Developing this concept further, other developments can be grouped into tiers, which reflect the likely degree of certainty attached to each development, with Tier 1 being the most certain and Tier 2 the least certain. This is illustrated in **Table 2.2**.

Table 2.2 Other Developments to be Considered in the CEA

Hierarchy of other developments	Certainty of other developments
Tier 1	Operational development ([e.g.,] wind farms, mineral sites and landfill sites)
	Under construction*.
	Permitted application(s), whether under the *Town and Country Planning (Scotland) Act 1997* [as amended by the *Planning etc (Scotland) Act 2006*] or other regimes, but not yet implemented.
Tier 2	Submitted application(s), whether under the *Town and Country Planning (Scotland) Act 1997* (as amended) or other regimes, but not yet determined.
[Tier 3]	Projects for which a Scoping Report and/or a Pre-application Consultation Report have been submitted
	Identified in the relevant Development Plan (and emerging Development Plans - with appropriate weight being given as they move closer to adoption) recognising that much information on any relevant proposals will be limited.
	Identified in other plans and programmes (as appropriate) which set the framework for future development consents/approvals, where such development is reasonably likely to come forward.

Decreasing level of detail likely to be available

* Where other projects (i.e. new permanent development such as new housing estates etc) are expected to be completed before construction of the Proposed Development, and the effects of those projects are fully determined, effects arising from them are considered as part of the baseline and therefore as part of the assessment of both the construction and operational phases. This EIA Report will therefore should clearly distinguish between projects forming part of the baseline and those in the CEA.

2.8.3 In the context of the Proposed Development, and in line with the EIA regulations[5], sufficiently detailed information required to undertake a CEA is available only for Tier 1 developments. Therefore, such developments, where they are located within the ZoI for a given environmental topic, have been subject to CEA. These developments are discussed, as appropriate, in the sub-section of each environmental topic chapter that deals with the assessment of cumulative effects.

2.8.4 Other projects substantially in the public domain either by virtue of an application, scoping report or a consultation into a specific infrastructure project are excluded as there is insufficient information available to the EIA team. In addition, limited weight should be given to schemes at application stage, as an application may never be granted consent. In the case of other wind energy developments, key information is required about the number, location and size of turbines for a full assessment of cumulative effects to be carried out.

2.8.5 In respect of potential cumulative effects with other schemes, **Table 6.4** in **Chapter 6: Landscape and Visual Impact** sets out all the wind turbine developments identified for assessment in the Cumulative LVIA and includes existing and consented developments.

Each other technical chapter then assesses the cumulative effects based on the ZoI for that technical chapter.

[5] The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017, Schedule 4 Information for inclusion in environmental impact assessment reports, at regulation 5. *A description of the likely significant effects of the development on the environment resulting from, inter alia:.....(e) the cumulation of effects with other existing and/or approved development, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources.*

3. Scheme Need, Alternatives and Iterative Design Process

3.1 Need for the Project

3.1.1 As set out in **Volume 5: Planning Statement** and **Chapter 5** of the EIA Report, Scottish planning policy provides support for wind development in principle and encourages local authorities to guide developments towards appropriate locations.

3.1.2 The Onshore Wind Policy Statement (December 2017) confirms the importance of renewable energy, including onshore wind, for meeting climate change targets and that onshore wind is a vital component of the economic opportunity that renewables more generally create for Scotland. The Policy Statement identifies that the important role for onshore wind means that development in the right places must be supported, and – increasingly – the extension and replacement of existing sites, where acceptable, with new and larger turbines, based on an appropriate, case by case assessment of their effects and impacts.

3.1.3 The Scottish Energy Strategy (December 2017) and the Onshore Wind Policy Statement both recognise the role of onshore wind as a key contributor to the delivery of renewable energy targets – specifically the new 2030 50% energy from renewable sources target.

3.1.4 The Proposed Development would represent a significant contribution, not just in terms of renewable energy output, but in the savings associated with $C0_2$ output (see **Appendix 9H: Peat Management Plan** for calculations and information). The increase in renewable energy output as a result of the Proposed Development would ensure further progress towards meeting the national and international targets in limiting the amount of greenhouse gas emissions outlined in **Chapter 5**.

3.1.5 The Scottish Government target to deliver the equivalent of 100% of Scottish electricity consumption from renewables by 2020 equates to around 16GW of installed renewables capacity. However, the 50% energy from renewable sources by 2030 target in the Scottish Energy Strategy may require in the region of 17GW of installed renewables capacity by 2030.

3.1.6 Figures released in the Energy Statistics for Scotland (December 2018) show that as of September 2018, 10.5GW of renewable electricity capacity was operational in Scotland. The installed capacity of the Proposed Development would help to reduce the significant shortfall predicted against the Scottish 2020 renewable energy generation target. It would make an important contribution to the 2030 target, which the Scottish Government has identified may require renewable electricity to generate 140% of Scotland's electricity needs for the energy target to be met.

3.2 Site Selection Process and Consideration of Alternatives

3.2.1 The careful selection of potential wind farm sites is a critical aspect of the overall wind farm development process. In this instance, the Development Site was originally identified through a study commissioned in 2008 by the Scottish Government and undertaken by Halcrow Group Ltd with the key objective *"…to help the Western Isles to deliver economic and community benefit by identifying renewable energy potential, including the role for different scales of energy generation compatible with environmental obligations"*.

3.2.2 In January 2009, results of the study were published in the *Economic and Community Benefit Study, Final Report* (the 'Halcrow Report'). The study was undertaken in conjunction with key economic and environmental stakeholders: Scottish Natural Heritage (SNH), Scottish Environment Protection Agency (SEPA), Comhairle nan Eilean Siar (CnES), Highland and Island Enterprise (HIE) and the Scottish Government.

3.2.3 A sustainability appraisal undertaken as part of this study identified that there was strong stakeholder support for a large-scale commercial wind farm development near Stornoway, but less so in most rural areas of Lewis. The sustainability appraisal identified that the only feasible area for a large-scale onshore wind farm development in North Lewis was an area south-west of Stornoway, outside of the Lewis Peatlands Special Protection Area (SPA).

3.2.4 The Stornoway Wind Farm site is based on this area identified in the Halcrow Report. The development site boundary lies immediately to the south-east of the Lewis Peatlands SPA and RAMSAR site and at its closest approximately 900m south-east of the Lewis Peatlands Special Area of Conservation (SAC).

3.2.5 The Applicant has been involved with the development of the Development Site for a number of years and has found that it remains suitable for a wind farm due to the following factors:

- Suitable wind speeds;
- Suitable separation distance from residential properties and an absence of settlements within 1.5km;
- Availability of land;
- Available grid connection;
- Ability of landscape area to accommodate wind farm development of the scale proposed;
- Suitable land area to accommodate wind turbines;
- Nature of land uses;
- Access;
- Ground conditions;
- The absence of internationally and nationally designated ecological and landscape sites within the Development Site;
- Aviation considerations in terms of the ability to provide suitable mitigation.

3.2.6 Detailed feasibility studies were carried out by the Applicant to closely examine the suitability of the Development Site in terms of the above criteria and in summary:

- The national wind speed database (known as the Numerical Objective Analysis Boundary Layer (NOABL)) estimated that wind speeds across the Development Site were in the range of 7.8- 8.7 m/s for the 45m above ground layer dataset;
- The Development Site consists of a mixture of open moorland with areas of stunted woodland and includes many watercourses and lochs. Parts are used for livestock grazing and have been man-modified by the operational Beinn Grideag Wind Farm and current and historic peat-cutting;
- The Development Site does not have any landscape or nature conservation designations and there are no Scheduled Monuments, Listed Buildings, Conservation Areas or Gardens and Designed Landscapes within it;
- The Development Site lies within the Boggy Moorland Landscape Character Type that is considered to be of "Low-Medium Sensitivity" from a landscape perspective, is resilient to

change and is able to absorb development in many situations without significant character change;

- Electrical connection is feasible;
- The Development Site is accessible from adjoining roads.

3.2.7 For the above reasons, the Development Site was considered suitable for detailed investigation as a wind farm location.

3.2.8 The Consented Development provides confirmation that the Development Site is suitable for wind farm development. The design evolution for the Proposed Development commenced with the Consented Development (the 36 turbine wind farm), but with a technical objective of utilising larger and more productive turbines that reflected the latest technological advances for manufacture and design. A number of design iterations for the Development Site were prepared, which are discussed in **Section 3.5**.

3.3 Site Context

3.3.1 The Development Site is located to the west of the town of Stornoway on the Isle of Lewis, with the nearest residential property found around 1.8km from the nearest turbine location. **Figure 1.1** and **1.2** illustrate the Development Site location in local and regional contexts.

3.3.2 The topography of the Development Site ranges between approximately 50 – 150m Above Ordnance Datum (AOD); with three hillocks in its northern, central and southern areas. There are some areas of stunted woodland within the Development Site; however, the majority of vegetation comprises blanket bog and associated mosses and heather. There are a number of watercourses and lochs/lochans within the Development Site, none of which are designated. The former Bardon Quarry, which is now a landfill is located within the northern section of the Development Site, near Loch Airigh na Lic.

3.3.3 Other than the residential area of Stornoway to the east, the area surrounding the Development Site consists of boggy, undeveloped peatland.

3.3.4 The closest occupied residential property to the Proposed Development is situated within the settlement of Marybank, and is located 1.8km from the nearest turbine (T20). Immediately to the west of the Development Site lies the Lewis Peatlands RAMSAR, SPA and SAC, however the Development Site itself is not subject to any environmental designations.

3.3.5 The Proposed Development for which consent is sought and to which this EIA relates, is described in **Chapter 4: Project Description**.

3.4 Wind Farm Design Strategy

3.4.1 This section details the approach to wind farm design that was adopted for the Proposed Development. The more detailed phases of the development design of the Proposed Development has evolved taking into account the principles outlined in PAN 68: Design Statements (Scottish Executive Development Department 2006). This balance between maximising renewable electricity generation and avoiding environmental and engineering constraints is driven by an iterative wind farm design process, informed at a number of stages by the findings of the EIA. The final design proposed in this application submission has therefore taken account of the environmental and engineering constraints, maximising the energy yield and providing a coherent scheme that can be accessed and constructed.

3.4.2 The design process has taken account of the broad and strategic guidance in SNH '*Guidance on Siting and Designing Windfarms, Version 3a*' August 2017, the SNH spatial planning guidance 2015, the SNH cumulative guidance 2012, and the SNH landscape capacity study for onshore wind energy development in the Western Isles (SNH, 2004) as well as consultation with SNH, SEPA and CnES during key EIA stages (See the Pre Application Consultation (PAC) Report **Volume 6**).

Design Objectives

3.4.3 Key factors influencing the design of the Proposed Development included a number of landscape related design objectives which are set out here, along with consideration of peat, ornithological interests, ecological interests and existing communication links, infrastructure and utilities. The Development Site constraints are shown in **Figure 3.1.**

3.4.4 The design evolution for the Proposed Development is illustrated in **Figure 3.2**. The process commenced with the consented 36 turbine Stornoway Wind Farm, but with the aim of utilising larger higher power output turbines that reflected the latest technological advances for turbine manufacture and design in order to maximise energy yield whilst taking account of impacts on the environment.

Energy Yield

3.4.5 It is important that wind turbines are sited to capture the best available wind resource. This means maximising exposure to the prevailing winds, consideration of predicted turbulence levels, and appropriately spacing the turbines to minimise wake effects. In converting the energy from wind into electricity, there is a reduction in wind speed and an increase in turbulence immediately behind each turbine. This 'wake effect' can reduce the output of subsequent turbines in downwind locations, thus reducing the overall output of a wind farm. The wake effect can also impact on the reliability and longevity of turbine components and appropriate spacing is therefore an important consideration to ensure that manufacturers will warrant the turbines once procured. The Proposed Development has therefore been designed with appropriate wake separation spacing.

3.4.6 The Proposed Development also seeks to take advantage of significant advances in turbine size and power output to achieve a design that is financially viable given the reliance on and cost implications of the Western Isles Interconnector.

Technical

3.4.7 The following technical constraints were applied where possible:

- Avoid wind turbines and crane pad hardstandings being located on steep slopes (more than 14% slope gradient), in line with **Appendix 9.H Peat Management Plan** with regards to peat slide risk and to reduce the potential for major accidents and disasters, specifically landslide, occurring;
- Avoid access tracks and wind farm tracks being located on slopes exceeding 12% slope gradient (perpendicular to contour), in line with **Appendix 9.H Peat Management Plan** with regards to peat slide risk and to reduce the potential for major accidents and disasters, specifically landslide, occurring;
- Wind turbines separated at equal to or greater than minimum manufacturer recommended distances to enhance the available wind resource and avoid operational issues, in particular taking into account existing wind farms;
- Avoid identified telecommunications and utility infrastructure through the application of appropriate stand-offs to overhead lines, substations etc to avoid the risk of major accidents

and disasters occurring, specifically electricity system and/or telecom links failure, as a result of construction activities or possible turbine collapse;

- Selection of an appropriate access route to the Development site for HGVs and abnormal loads to avoid the risk of major accidents and disasters occurring, specifically transport accidents, as a result of the increase in traffic from construction works; and
- Apply appropriate stand-offs to roads to assure driver safety should severe weather i.e. extreme temperatures cause ice throw or storms cause turbine collapse.

3.4.8 The Applicant is continuing consultation with aviation and radar operators with regard to identifying appropriate mitigation measures to mitigate any potential effects on aviation and radar assets. Further information on aviation effects are set out in **Chapter 11: Telecommunications and Aviation**.

Land Use

3.4.9 The following land use constraints were applied:

- Avoid turbine blades oversailing land neighbouring the Development Site.

Environmental

3.4.10 The following environmental constraints were applied:

- Avoid areas of deepest peat (in excess of 3m) wherever possible, in line with **Appendix 9.H Peat Management Plan** with regards to peat slide risk and to reduce the potential for major accidents and disasters, specifically landslide, occurring;
- Avoid areas at high risk of peat slide (see peat slide risk assessment in **Appendix 9H**, in line with **Appendix 9.H Peat Management Plan** with regards to peat slide risk and to reduce the potential for major accidents and disasters, specifically landslide, occurring;
- Apply appropriate stand-offs from watercourses to reduce the potential for major accidents and disasters occurring, specifically flooding, which may damage turbines or infrastructure, or increase flood risk elsewhere. A minimum avoidance buffer zone of 50m has been applied around all watercourses and other natural hydrological features; with the exception of watercourse crossings, which are minimised as far as practical; Seek to avoid areas of sensitive ecological habitat as defined by the National Vegetation Classification (NVC) on the basis of a vegetation sensitivity classification, which sought to categorise these habitats as high, moderate and low sensitivity:
  - High - applies to areas of blanket bog with a higher proportion of wet hollows and pools defined by NVC communities: M1, M17a and M17b;
  - Moderate - applies to areas of good condition blanket bog, which does not have a significant amount of hollow/pool habitat and defined by NVC communities: M1, M3, M17a, M17b and M19a; and
  - Low - applies to areas of modified blanket bog where it has previously been drained and planted with conifers, usually with a very high purple moor-grass content, defined by NVC communities M17a,b, M17mod and M25a,b.
- Apply an avoidance buffer zone of 100m (from tracks and cable trenches) and 250m from borrow pits and foundations, wherever possible, to potentially sensitive Groundwater Dependent Terrestrial Ecosystems (GWDTE) that are considered by SEPA to contain highly groundwater-dependent NVC communities. Where this buffer is encroached on, mitigation

would be incorporated if possible to minimise impacts on both surface and sub-surface water flows;

- Apply an avoidance buffer of 50m to all recorded cultural heritage features as identified from the desk-based assessment and site walkover where possible;
- Avoid areas/apply appropriate buffers where protected species have been identified where possible including otter holts and couches and areas of high activity of high value bird species as far as possible;
- Incorporate flight corridors and widely spaced turbines designed to mitigate potential impacts on red throated divers (See **Figure 3.1**); and
- Achieve a design where noise emissions meet permitted limits individually and cumulatively with other nearby wind farms.

Landscape and Visual

3.4.11 The inherent nature of wind turbines as tall, modern structures means that the form of the wind farm is important. Clear design objectives are necessary and the appearance of the Proposed Development as an object or composition in the landscape has been a factor in generating the layout. In this respect, the design evolution has taken account of the following:

- SNH Guidance on Siting and Designing Windfarms, Version 3a (2017);
- SNH Guidance on Spatial Planning for Onshore Wind Turbines – natural heritage considerations (2015);
- Comments from SNH regarding design advice in its scoping opinion (22 August 2018);
- Comments from CnES in its scoping opinion and at the Design 'Chill' meeting (6 November 2018);
- Location Siting in relation to the SNH Capacity Study (the study, however, was produced in 2004 and does not take into account larger turbine typologies and the most up to date cumulative baseline); and
- Design evolution of the Consented Development.

3.4.12 The landscape and visual design objectives from the Consented Development were reviewed against SNH guidance and amended as necessary (these design objectives are also set out in **Chapter 6**: **Landscape and Visual Impact**). The design evolution for the Proposed Development is illustrated in **Figure 3.2**. The process commenced with the Consented Development for 36 turbines, but with the aim of utilising larger turbines with a higher power output that reflected the latest technological advances for manufacture and design.

3.4.13 The landscape design principles and evolution from the Consented Development have been reviewed against the current SNH and Capacity Study guidance and have been considered in developing the design of the Proposed Development as follows:

  - The design process has sought to create a simple and cohesive wind farm composition within the Boggy Moorland (Boggy Moor 1) LCT either on a solus basis or cumulative, taking account of the existing and consented wind farm developments;
  - The design of the Proposed Development has taken into account the location siting and capacity of the Boggy Moorland as described in the SNH Capacity Study. It is acknowledged that this large-scale landscape can accommodate large turbines;

- Consideration has been given to overall turbine height with regards to key visual receptors, with the design development comprising a multiple height option;
- The turbine layout has been largely contained within the currently consented turbine area, except in the northwest. The Consented Development did not have turbines consented in this area because of bird activity previously recorded. More recent surveys suggest that because of the operational 7 turbines at Pentland road, bird activity in this northern area of the Development Site has substantially changed. This northern area is now less sensitive to bird activity and is now available for turbine development. Because of this, it is possible to set back turbines from the outer edge of Greater Stornoway;
- A 1,800m set back from residential properties has been achieved, an increase on the minimum 1,500m set back of the consented turbines;
- The vertical and horizontal scale of the turbines has been limited to appear, as far as practical, compatible with the scale of the landscape;
- The turbine heights of T7, T15, T16, T19, T20, T21, T29, T30, T33, T34, located in the east of the Development Site, have been limited to a maximum of 156m to blade tip to reduce their impact when viewed from Stornoway (including Greater Stornoway) and other receptors in the east and northeast;
- The Proposed Development has continued to maintain very limited visual effects from the Standing Stones of Calanais visitor attraction; and
- The Proposed Development has avoided significant individual or cumulative effects on the landscape character and the special qualities of the South Lewis, Harris and North Uist National Scenic Area (NSA);
- An initial concept layout (33 turbines) was examined with a combination of a maximum of 155m and 187m to blade tip. This initial concept was the subject of the request for a scoping opinion and was examined by all technical and environmental topic leads involved with the EIA. This was followed by the creation, exploration and analysis of a series of iterative layouts responding to a range of technical and environmental constraints;
- The various design layouts have sought to achieve the landscape design principles and mitigate potential landscape and visual effects. This aspect of the design was judged via a panel of three chartered landscape architects, familiar with wind farm design;
- A range of alternative turbine blade tip heights were considered (145m, 150m, 155m, 156m, 175m, 180m, 187m, 200m and 220m) and the corresponding turbine spacing was increased to allow for a greater wake separation requirement resulting in a range of options based on layouts of between 14 and 43 turbines, spread across the Development Site.

3.4.14 The design evolution therefore has taken account of the pattern of development, the landscape capacity and the quality and aesthetics of the design of the Proposed Development. The threshold distance at which significant effects would be realised would broadly be the same as for the Consented Development, i.e. 5km for landscape effects and 14.1km for visual effects.

Design Consideration in Relation to Comments from SNH

3.4.15 The ‘sensitivities’ listed by SNH in their scoping opinion have been reviewed and considered in the design and assessment of the Proposed Development as follows:

Table 3.1 Consideration of SNH Sensitivities

SNH 'Sensitivity'	Design Consideration of the Proposed Development
The position of the windfarm in relation to both the town of Stornoway and the interior peatlands. It will be important that the windfarm does not seem to impinge upon and/ or surround the settlement when seen from key viewpoints within and approaching the town, including from the ferry route. It will also be important that the windfarm does not seem to diminish the characteristic sense of wide open space across the interior peatlands; for example, by being associated with Stornoway yet being seen from the north coast, thereby seeming to reduce the sense of wide open expanse that currently seems to separate these areas.	A key consideration during the design process has been to create a buffer between the Proposed Development and both the Core Settlement and Greater Settlement of Stornoway. This is in line with guidance in '*Siting and Designing Wind Farms in the Landscape, Version 3a*' (SNH, 2017) which states that '*There may be some locations where larger wind turbines can be accommodated near to or within urban and industrial locations. … In these settings, large wind turbines can appear most appropriate where they are separated slightly from buildings; are seen set back against an area of visual simplicity; or are marginal to the urban/industrial area.*' (Para 3.45). Shorter turbines (up to 156m) on the eastern edge of the Proposed Development have also been a key design principle of identifying an appropriate 'fit' with the landscape and to minimise visual effects. Although the design was also influenced by other environmental and technical constraints (see **Figure 3.1** for constraints), views from key viewpoints have been considered to optimise the fit of the turbines in the landscape and in views from within the settlement. Views from within the Core Settlement illustrate that there would be limited visibility of the Proposed Development which was achieved by increasing the distance of the turbines from the settlement (in comparison to the Consented Development) with a reduction in height. The Proposed Development's relation to Stornoway in views looking towards the settlement has also been considered through viewpoint analysis in views from ferries (Viewpoints 8 and 16) and in views across the open moorland from the north (Viewpoints 7 and 21) and from the west (Viewpoint 13).
The varying local landscape character over the windfarm site. This may mean that the character of the windfarm could also vary over the site and thus create a confusing image with sub-groups.	Landscape character has been considered in relation to the SNH LCA (2019) and the SNH Capacity Study (2004) which further subdivides a number of LCTs including the host *Boggy Moorland – Boggy Moor 1 and 2*. During the design process, consideration was given to various local landscape features within the Development Site including lochs, watercourses (maintaining a minimum stand off of 50m) and areas of deep peat (avoiding areas of deepest peat (i.e. more than 3m)) to avoid creating a '*confusing image with subgroups*'. A range of close-range viewpoints (Viewpoints 1, 3, 4 and 5) were considered to unify the wind farm design in terms of landscape character.
The irregular nature of the landform. This may limit the number and position of wind turbines in order to create a simple windfarm image, avoiding variable elevation, spacing, outliers and overlapping of wind turbines within views.	Various constraints were used during the design of the Proposed Development and final positioning of the turbines. These included the use of multiple turbine heights in achieving a more balanced composition of turbines from key viewpoints (2, 4, 7, 8, 17, 24, 25 and 26) which complement the horizontal and vertical scale of the landscape. The design of the Proposed Development has aimed to minimise variable elevation, spacing, outliers and overlapping from key viewpoints.
The location of roads through the windfarm site along which the receptor sensitivity will be high and the scale of the wind turbines would be emphasised at close proximity to high numbers of receptors. Impacts would be limited significantly if the windfarm development could be restricted to one side of key routes.	The positioning of proposed turbines in relation to roads (particularly the A858, A59 and Pentland Road) was a key consideration during the design process. Offset buffers were used to set turbines back from roads. During the design process, True View Visuals 3D software was used to gain an understanding of the turbine positioning and to gain an impression of the scale of the turbines in views from these routes. Locating turbines south of the A859 was avoided, this being a key principle of the design evolution of the Consented Development. It was acknowledged that existing wind farm development was an existing feature on both sides of the A858 and that localised landform provides degrees of partial screening along the route as it passes through the Proposed Development (Pentland Road / A858 sequential viewpoint 4 – **Figure 6.22c-d** in **Chapter 6**).
The impact of existing and consented windfarms within the area. The proposal will need to relate to these in character and location to avoid conflicts of design, including wind turbine size.	The existing turbines (Beinn Ghrideag and Pentland Road) were taken into account in developing the overall composition of the Proposed Development. Separation distances and their place within the overall composition were key elements of the design. Consideration of height difference was also used to identify the turbine layout which resulted in the use of two different wind turbine heights.

SNH 'Sensitivity'	Design Consideration of the Proposed Development
	The Proposed Development is located in the same LCT (Boggy Moor 1) as the existing Beinn Ghrideag and Pentland Road wind farms and is a large-scale, open moorland landscape capable of accommodating large wind farm development. In line with guidance for the siting of wind farms near settlement, the Proposed Development was designed to incorporate existing wind farm development in order to prevent *'...multiple wind farms dominating the landscape surroundings of a settlement'* [in this case, Stornoway]. (paragraph 4.15, Siting and Designing Wind Farms in the Landscape, Version 3a, 2017).
The relationship between wind turbine height and the scale of existing features within the landscape. It will be important that the wind turbines do not seem to dominate the prominence of existing vertical features and landmarks such as the Barvas hills, and structures within and surrounding Stornoway, including the Lews Castle.	The effect on existing features (as illustrated in **Figure 6.15b** in **Chapter 6**) in the landscape were a key part of the design process. Viewpoints were identified to assess the potential effects of the Proposed Development on landmark features and structures including Lewis War Memorial, Gallows Hill (near Lews Castle) and Standing Stones of Calanais (Callanish). More distant views of these landscape features were also used in views from the Eye Peninsula and the ferry where the Barvas hills were also visible. The landscape scale of the Development Site, its landscape character and that of the surrounding landscape context from which the Proposed Development would be viewed has influenced the choice of turbine ratio or turbine proportion.

3.5 The Proposed Development Design Evolution

3.5.1 The design evolution for the Proposed Development commenced with the consented 36 turbine wind farm, but with a technical objective of utilising larger and more productive turbines that reflected the latest technological advances for manufacture and design.

3.5.2 The Applicant and its consultants have undertaken a number of discussions with statutory and non-statutory consultees, the local community (see **Chapter 2, Section 2.4)** and the landowners, with the accumulated findings all having an influence over the evolution of the design and the scope of the EIA process.

3.5.3 A number of queries and issues applicable to the Proposed Development have been raised throughout the community engagement process and these are addressed in more detail within the PAC Report in **Volume 6** of the application submission (see **Chapter 2** for an overview of the consultation process). Comments received relating to location, design and wind farm developments generally covered:

- Chapter 6: Landscape and visual effects;
- Chapter 8: Ornithology;
- Chapter 9: Ecology;
- Chapter 11: Hydrology including peat; and
- Cumulative effects (included in each chapter).

3.5.4 **Table 3.1** sets out the primary design iterations, and **Figure 3.2** illustrates the iterations within the Development Site.

Table 3.2 Design Iterations

Design Number	Constraints Influencing Layout	Design Rationale / Summary
Layout 1 **Consented 36 Turbine Layout** **March 2018**	This layout served as a starting point for consideration of the Proposed Development. The turbine locations remained the same but larger, 187m high turbines were used instead of the consented 145m turbines.	The Consented Development was the start point for the design process. This comprised 36 turbines to a height of 145m. The number of turbines was reduced prior to the scoping exercise to 33 turbines, and the turbine heights increased to 187m. (See (**Appendix 2A**). This was the initial concept layout that was examined by all technical and environmental disciplines involved with the project. This was followed by the creation, exploration and analysis of a series of iterative layouts responding to a range of technical and environmental constraints. Turbines were located too close together to allow for an efficient design from a wind energy perspective due to the increased rotor diameter size. Survey data identified an increase in some bird activity that had the potential to cause a barrier to birds using the SPA and the sea. There was also some turbine overlapping in a number of key views including Viewpoints 2, 4, 8, 24 and 25.
Layout 2 **S6 Layout 30 turbines** **July 2018**	This iteration was the outcome of a further landscape and visual focused feasibility exercise, which used a mixture of turbine heights to explore various layout options. The key driver behind this layout was landscape and visual composition, taking into account known technical and environmental constraints.	Turbine numbers and some turbine heights were reduced to account for increased wake requirements for larger turbines. Hydrological, ecological and geological constraints, communication links and residential standoff buffers were considered in this layout design and all others going forward. The extent of the wind farm in the landscape remained largely the same as the consented layout, with the exception of the north-western part of the Development Site. The consented development had no turbines here due to bird activity, but the subsequently operational Pentland Road wind farm appeared to have influenced bird activity on the Development Site and this formerly sensitive area appeared less constrained.
Layout 3 **S9 Layout (Design Day) 35 turbines** **October 2018**	This iteration was the result of the Design Day held in October 2018, whereby all known technical and environmental constraints were considered. Several iterations were produced during this session exploring various options and this iteration was the final outcome. Constraints which influenced the design included sensitive NVC habitats, watercourses, communication links, peat depths, topography and separation distances from Beinn Greidaig Wind Farm.	Further design refinement was undertaken on the layout following further energy yield assessment which allowed the turbine separation to be reduced from 6x4 rotor diameter to 5x3 rotor diameter) and for additional turbines to be incorporated into the same envelope.
Layout 4 **S11 Layout 32 turbines** **November 2018**	This iteration was developed following the provision of additional survey information. A number of turbines were relocated in order to address potential ornithological issues, and three turbines were removed from the western part of the site. A number of turbines were relocated to move them away from deeper peat – T10 and T26 moved out of deep peat. T7 was moved further north west (into shallower peat) to reduce impact on a cultural heritage feature.	Following on from updated ornithological surveys, two 500m corridors were created to accommodate diver flight routes between lochs and feeding grounds. Where possible turbines were removed from these areas entirely, or were located on the periphery of the buffer areas. In addition, larger buffers were applied to Raptor nests, resulting in the removal of one turbine, as well as maintaining bugger zones for water courses where possible and avoiding areas of deepest peat (in excess of 6m).

Design Number	Constraints Influencing Layout	Design Rationale / Summary
Layout 5 **S12 Layout 34 turbines** **December 2018**	This iteration contained relatively minor tweaks to turbine locations to address stacking from certain viewpoints, as well as further amendments regarding bird corridors. T30 was relocated into shallower peat.	To remove turbines from identified diver flight corridors and to avoid areas of deepest peat (reduced to deep peat areas of 3m).
Layout 6 **Design Freeze EIA Layout 35 turbines** **January 2019**	This iteration took into account updated peat survey data and sought to avoid areas of deep peat where possible. In addition, a space for an additional turbine was identified following design review. T17, T24, T32 and T34 were all relocated taking into account the updated peat survey data into shallower peat locations.	Full peat surveys had been ongoing during the design process. Additional peat probing was carried out during January and February 2019 at specific turbine locations to identify peat depths and potential alternative locations.

3.6 Additional Wind Farm Infrastructure Design Evolution

Borrow Pits

3.6.1 The Consented Development proposed to use up to seven onsite borrow pits. The Proposed Development would utilise the onsite stone resource from five identified borrow pits. A separate document (the **Planning Statement, Volume 5**) has been produced to accompany the application submission for the Proposed Development and includes an assessment regarding the borrow pits. The Borrow Pit Assessment considers the need for the borrow pits at the Development Site and the potential effects that could result from the construction and operation of the five proposed borrow pits, drawing on the environmental conclusions set out in the **EIA Report**.

3.6.2 It is anticipated that most of the rock required for construction would be sourced from borrow pits within the Development Site. It is expected that concrete would be sourced from nearby suppliers, and as such, the EIA has presented a robust worst case assessment. **Chapter 13: Traffic and Transport** has assessed both use of onsite borrow pits, and off-site concreting, as well as off-site quarry stone (i.e. no onsite borrow pits) and off-site concreting.

3.6.3 The area of search for the borrow pits are fixed as stone can only be extracted where it is found. After identifying suitable stone resource within the Development Site, the following principles have been used to identify suitable locations for the borrow pits and to minimise environmental effects:

- Aim to locate borrow pit search areas on lower slopes;
- Aim to locate borrow pits in areas that are enclosed by landform i.e. on internal hill slopes;
- Aim to locate in areas where existing extraction has already taken place to minimise further landscape effects; and
- Aim to locate borrow pits more than 1,500m from residential receptors.

Access from Port to the Development Site

3.6.4 The route to the Proposed Development Site for abnormal vehicles is illustrated in **Appendix 13A**. The delivery route for abnormal loads is from Arnish Yard, some 4km to the southeast of the Development Site.

Site Infrastructure and Internal Track Design Evolution

3.6.5 The non-turbine infrastructure required on site was designed and arranged in such a way as to avoid the identified on-site constraints where possible. Whilst the majority of the infrastructure layout was designed following the turbine layout design, some minor iterations to turbine locations and track alignments were necessary to facilitate the optimum on-site infrastructure requirements. access track routes in particular are designed to minimise water crossings and to avoid potentially sensitive areas within the Development Site.

3.6.6 Details of the track construction types are set out in **Figures 4.6** and **4.7**, and are shown in **Figure 4.1.**

Crane Hardstandings

3.6.7 Similar to the internal access tracks, areas identified for crane hardstandings were identified to avoid areas of deeper peat, sensitive ecology habitats and areas of steeper gradients where possible. These areas of hard standing are identified on **Figure 4.1** and an example of an indicative crane hard standing is included in **Figure 4.5**.

Substation

3.6.8 The Proposed Development would require the construction of a new primary substation to export electricity to the national grid, and two secondary substations for internal grid management. This would entail the construction of a new transformer and control building. The location of the substation is identified on **Figure 4.1** and an example of the substation is included in **Figure 4.10a-b**. The location of these compounds has taken account of sensitive ecology areas, peat and hydrology.

Construction Compounds

3.6.9 The locations of the main construction compound and secondary storage areas identified have taken account of sensitive ecology areas, peat and hydrology. These temporary construction compounds are identified on **Figure 4.1** and an example of an indicative construction compound arrangement is included in **Figure 4.11a -b**.

Wind Turbine Foundations

3.6.10 Rock anchor / cage foundations, as discussed in **Chapter 4**, would be used where possible instead of gravity-based foundations to minimise the quantity of peat required to be removed for the turbine foundations. It is anticipated that 8 gravity-based foundations (as illustrated in **Figure 4.3**) and 27 rock anchor / cage foundations could be required for the Proposed Development. An example of a rock anchor design is shown in **Figure 4.4**.

3.7 References

Lewis Wind Power, Stornoway Wind Farm Environmental Statement, 2011.

Scottish Government (2017), Onshore Wind Policy Statement.

Scottish Government (2017), Scottish Energy Strategy.

4. Description of the Proposed Development

4.1 Introduction

4.1.1 This Chapter provides an overview of the Proposed Development, including a description of the Development Site, infrastructure elements, and the key elements of the construction, operational and decommissioning phases. The Proposed Development, including the mitigation measures outlined in each of the technical chapters, is presented by the Applicant as the basis for the Section 36 application. The extent of the Development Site and its wider geographical context is set out in **Figure 1.1** and **Figure 1.2.**

4.1.2 The description of the Proposed Development presented in this Chapter has been used by the EIA technical specialists as the basis for assessing its effects on the environment.

4.2 Development Description

4.2.1 The Proposed Development is a wind farm consisting of a maximum of 35 wind turbines, each with a three-bladed rotor with a radius of up to 150m. Two maximum turbine heights are proposed to be deployed within the Development Site to accord with the surrounding landscape and views from residential areas (the design evolution is discussed in **Chapter 3: Scheme need, alternatives and iterative design process**). Along the eastern side of the Site, ten turbines have proposed heights of up to 156m to blade tip, whilst the remaining 25 turbines would consist of wind turbines of up to 180m to blade tip (**see Figures 4.2a-b,**). **Table 4.1** provides the maximum tip heights for each turbine.

4.2.2 The two turbine types would have an estimated generating capacity of approximately 5.6MW giving a combined generating capacity of 196MW.

4.2.3 The application also comprises associated infrastructure including internal wind farm tracks, watercourse crossings (including bridges), crane pads, borrow pits, temporary construction compounds, laydown and storage areas and grid connection infrastructure (including up to 3 substations and battery storage facilities).

Site Location

4.2.4 The Development Site is approximately centred on National Grid Reference (NGR) E 137149, N 933373 to the west of Stornoway on the Isle of Lewis. The A859 borders the east and south eastern boundary of the Development Site, and an unclassified road runs through it in an east / west alignment and then along the western boundary, heading south-west.

Existing Site and Surroundings

4.2.5 The Development Site predominantly consists of a mixture of open moorland with areas of woodland and includes a large number of streams and lochs. There is evidence of historical peat extraction across the Development Site, with much of this in close proximity to the A859. The Development Site encloses an area approximately 1,700 hectares and is shown in **Figure 1.1** and **Figure 1.2**.

4.2.6 The town of Stornoway is located to the east of the Development Site, with the nearest residential property found around 1.5km from its boundary.

4.2.7 There is consent for the 36-turbine Stornoway Wind Farm on the Development Site (the Consented Development).

4.2.8 An operational wind farm (Beinn Gredaig), consisting of 3 wind turbines is located in the western part of the Site (see **Figure 4.1**). This wind farm became operational in May 2015 and is not connected to the Applicant's proposal, although it does fall within the Development Site.

4.2.9 The 7 turbine Pentland Road scheme is located directly to the north, north west of the Development Site. The three turbine Arnish Moor wind farm is located 1.2km to the south, south east of the Development Site.

4.2.10 Marybank Quarry is located approximately 50m to the east of the Development Site and 2.2km from the nearest turbine location, and a landfill and recycling centre is located within the site boundary, approximately 650m from the nearest turbine location.

4.2.11 A council depot including salt storage areas is located within the Development Site boundary, along the access route from the A859. The Creed Business Park is located 50m to the east of the site, approximately 1.9km from the nearest turbine location.

4.2.12 The site of the former Lewis Chemical works is located between Marybank Quarry and the Development Site.

4.2.13 The Lewis Peatlands Special Protection Area (SPA) is located to the immediate west and north of the Development Site. This 586km^2 designated site encompasses both upland and lowland areas of mainly heather moorland and rough grassland and occupies most of the northern half of the Isle of Lewis. The SPA comprises an extensive area of deep blanket bog, interspersed with bog pool complexes and freshwater lochs. The peatlands are of importance for a range of characteristic peatland breeding birds, especially waders, divers and raptors.

Development Proposals

4.2.14 The redesign of the Consented Development was primarily driven by the emergence of larger wind turbines that offer opportunities for increased generation, ensuring that the project optimises yield and productivity, making the best use of a high resource site and thereby maximising the amount of renewable energy generated in order to contribute to the UKs renewable energy targets.

4.2.15 The layout of the Proposed Development incorporating maximum tip heights of 180m (for 25 of the turbines) has been chosen because it balances sustainably high productivity with the environmental sensitivities present at the Development Site. Each chapter takes an appropriate and topic specific approach to assessment of the Proposed Development within identified parameters that are set out in **Table 4.1**.

Table 4.1 Application Turbine Parameters

Turbine ID	Easting	Northing	Max Tip Height	Max Rotor Diameter
1	134518	931471	180m	150m
2	135057	931501	180m	150m
3	135334	930964	180m	150m
4	135974	931083	180m	150m
5	136504	931093	180m	150m

Turbine ID	Easting	Northing	Max Tip Height	Max Rotor Diameter
6	137085	931096	180m	150m
7	137745	931334	156m	136m
8	137459	931647	180m	150m
9	137054	931906	180m	150m
10	136256	931758	180m	150m
11	135678	931644	180m	150m
12	135509	932128	180m	150m
13	136047	932198	180m	150m
14	136837	932330	180m	150m
15	137962	932171	156m	136m
16	138185	932705	156m	136m
17	137539	932809	180m	150m
18	137197	932997	180m	150m
19	138130	933104	156m	136m
20	138511	933652	156m	136m
21	138265	934003	156m	136m
22	137306	934087	180m	150m
23	137124	934521	180m	150m
24	136467	934645	180m	150m
25	136497	935172	180m	150m
26	137065	935045	180m	150m
27	137656	935217	180m	150m
28	137716	934787	180m	150m
29	138091	934590	156m	136m
30	138558	934796	156m	136m
31	138323	935192	180m	150m
32	138066	935798	180m	150m
33	138600	935760	156m	136m
34	138915	935506	156m	136m
35	137800	934040	180m	150m

4.3 Delivery Route

4.3.1 The route to the Development Site for abnormal vehicles and general site traffic is illustrated in **Appendix 13.A**. Route Analysis has been conducted for the turbine delivery route to the Development Site (see **Appendix 13.A)** and turbines are expected to be shipped to the port of Arnish approximately 4km to the south east (**Figure 13.1**). This deepwater port has facilitated wind turbine deliveries for both on and offshore developments in recent years and is capable of handling the turbine deliveries for the Proposed Development. The turbines would be transported along the existing port access road running north-west from it to the A859.

4.3.2 Depending on delivery requirements, upgrades to the Arnish port road may be required. Details of the full extent of required works are not available for this assessment. Any alterations to the Arnish port road would be the subject of a separate planning application and do not form part of this application.

4.4 Pre-Construction

4.4.1 This section describes those aspects that have become standard practice for developing a consented wind farm proposal into a buildable project. In the technical chapters of this EIA Report which follow, additional environmental management and mitigation proposals are set out and, for the avoidance of doubt, they are additional to the inherent mitigation that is embedded into the development proposals as described in this Chapter.

Environmental Management Plans

4.4.2 A Construction Environmental Management Plan (CEMP) would be produced prior to construction. Further details on the CEMP is set out below in **Section 4.7**. The construction works would require an overall Construction Method Statement (CMS) to set out overriding construction principles, programme and health and safety requirements etc. The overall CMS would be agreed with Comhairle nan Eilean Siar (CnES) in advance of commencement of development. Further details on the CMS is set out below in **Section 4.7**. Additional CMSs corresponding to individual construction activities would also be provided. They would identify reference documentation for that activity; principally the CEMP and also any relevant individual management plans (e.g. waste, habitat, water management plans), legislation and construction drawings and documents. For each construction activity, the CMS would detail all environmental sensitivities pertaining to the activity alongside the controls/mitigation measures to be put in place. Approvals or consents required to complete the activity would also be described.

4.4.3 Detailed mitigation plans are frequently requested as pre-commencement documents for agreement with the Planning Authority and relevant environmental regulators. Once these are agreed, the provisions and requirements set out therein would be incorporated into the CEMP. It is envisaged that the following would be required:

- A detailed Peat Management Plan (PMP) (**Appendix 9H**);
- A detailed Transport Management Plan (TMP);
- A Water Management Plan (WMP);
- A Habitat Management Plan (HMP) (**Appendix 9I**; and
- A Site Waste Management Plan (SWMP).

Geotechnical Investigations

4.4.4 Some preliminary Geotechnical Investigation (GI) work has been undertaken to date on the Development Site at turbine locations to allow for the design of foundations and locating of turbines.

4.4.5 Further GI would be carried out at the pre-construction stage to determine detailed ground conditions along tracks, and at construction compound and wind farm substation locations. This would provide support to the project team to develop further phases of detailed design work. The geotechnical fieldwork undertaken may include (but not be limited to): visual inspections; machine and hand excavated trial pits; windowless sample boreholes; rotary core boreholes; and sampling and laboratory based geotechnical and geochemical testing. This information would inform the detailed track design, the turbine foundation design and identify any micro-siting requirements.

4.4.6 The following considerations will feed into the GI strategy:

- All fieldworks to be conducted in accordance with BS5930, BS EN 1997 (Eurocode 7) and Site Investigation Steering Group (SISG) recommendations published in the "Specification of Ground Investigations" published by the ICE (1993);
- Competent and suitably qualified contractors would be used;
- Ground condition impacts on available access to GI locations (i.e. consideration of suitable vehicle and rig);
- Site specific induction to be given to all on site personnel prior to works commencing;
- Site work to be conducted in accordance with the construction Health & Safety Plan, Site Rules and Site Induction;
- Use tracked excavators/drilling rigs;
- Use bog mats to traverse areas of softer ground;
- Qualified engineer in attendance throughout fieldworks;
- Areas of sensitivity/high risk to be marked out prior to fieldworks starting, including works around watercourses and areas of peat; and
- Monitor weather conditions prior to and during fieldworks.

Environmental Clerk of Works (ECoW)

4.4.7 An ECoW would be appointed prior to construction and employed for the duration of construction related works (including post construction restoration). The role of the ECoW would be to manage the effects of construction works on the environment, make sure that the mitigation measures required as part of the EIA are implemented in accordance with the documents. The ECoW may change depending on technical requirement (i.e. a hydrologist would be used to confirm compliance with the PPP, an ecologist would be used to give tool box talks regarding otter mitigation, or an archaeologist used to define the areas to be fenced off to protect heritage features.

4.5 Construction Activities

4.5.1 It is expected that construction of the Proposed Development would be completed over an approximate period of 30 months. Due to commitments to undertake certain construction works during months when certain birds are not breeding and the unpredictability of weather (especially) during the non-breeding months, there may be downtime and delays in the construction programme. The anticipated construction activities are described below.

Enabling Works

4.5.2 Prior to the main construction phase commencing, a number of enabling works may be necessary, including:

- Geotechnical investigations: excavation of trial pits or boreholes;
- Any required upgrades to public roads, including road widening to allow the abnormal loads to negotiate corners, protection of any below ground services and the temporary removal or resiting of infrastructure (ie signage);
- Site Entrances: establishment of site offices and compound; and
- Borrow pits: establishment of borrow pit aggregate source on the Development Site and initial processing of stone.

Borrow Pits

4.5.3 Five borrow pits are proposed as the source of aggregate for construction of wind farm tracks, turbine bases, crane hard-standings, the main construction compound and auxiliary compounds, the substation compounds, and site office. The location of the proposed borrow pits is indicated on **Figure 4.1**.

4.5.4 Typically, aggregate extraction from borrow pits involves the following activities:

- Installation of perimeter drains to prevent surface water flows entering the excavated area;
- Creation of sumps and silt traps to capture subsurface flows and rainwater from the excavated area prior to discharge into the perimeter drains. These would allow suspended materials in the water to drop out before entering the drainage system;
- Upper layer of heather or grass (top 300mm minimum) would be turfed, rolled and located suitably near to the point of removal. Turves would be watered and maintained until reinstatement;
- Extracted material would be separated and machined/crushed within the borrow pit (or adjacent to it) and separated into stockpiles for use as general fill, structural fill or topping material.

4.5.5 Extraction of the material would involve blasting of rock, the methodology for this would be contained in a Quarry Management Plan if required

4.5.6 Following completion of construction, borrow pits would be restored to ensure that the ground is stable, safe and improve their visual appearance. The restoration plan for each borrow pit would draw on the advice of a landscape architect and an ecologist and would be designed in line with the proposed reinstatement materials and techniques available. It is anticipated that steep faces would be graded out to fit with the surrounding topography and disturbed surfaces covered with peat (details of this are set out in **Appendix 9H: PMP**). The reinstatement works would include habitat improvement within the borrow pit area where practicable. **Figures 4.12a-e** are detailed drawings of the borrow pits with indicative restoration profiles and an associated drainage plan.

4.5.7 **Table 4.2** below and **Figures 4.12a-e,** provide further information about borrow pits.

Table 4.2 Indicative Borrow Pit Volumes

Borrow Pit	Approx. Length (m)	Approx. Breadth (m)	Area (m^2)	Estimated Area Excavated (m^2)	Depth BP Floor (m)	Recovery %	Volume (m^3)
A	260	150	36,250	9,000	12.5	0.8	90,000
B	100	100	10,000	3,000	12.5	0.8	30,000
C	205	90	19,340	6,000	12.5	0.8	60,000
D	200	120	23,900	7,000	12.5	0.8	70,000
E	175	85	14,660	6,000	10.5	0.8	50,000

Alternative Lewis Quarries

4.5.8 It is anticipated that a limited amount of stone would need to be imported from existing on-island quarries for initial site set up works and to construct the section of track up to the first of the borrow pits. It is expected that the rock required would be sourced from one or more of the local established sources identified below;

Marybank – Bardon Hebrides

- Location: 2km west of the centre of Stornoway on A589 near turning to the fabrication yard at Arnish Point.

Creed Business Park – IA & C Maciver

- Location: 3km south west of the centre of Stornoway on A589 at turning to the Creed Enterprise Park.

Bennadrove – Bardon Hebrides

- Location: 3km west of the centre of Stornoway.

Loch Airigh na Lic – Bardon Hebrides

- Location: next to Bennadrove, 3km west of the centre of Stornoway.

Site Infrastructure

4.5.9 The following components would be required for the Proposed Development and typical design detail for these is shown on the accompanying figures listed:

- Wind turbines (**Figure 4.2a-b**);
- Wind turbine gravity base foundation (**Figure 4.3**);
- Wind turbine rock anchor foundation (**Figure 4.4**);
- Wind turbine crane hard standing (**Figure 4.5**).
- Floating roads detail (**Figure 4.6 (option A and option B)**);

- Excavated roads detail (**Figure 4.7**);
- Water crossings – bridges (**Figure 4.8**).
- Water crossings – culverts (**Figure 4.9**).
- Electrical connection, including substation building (**Figures 4.10a-b**);
- Temporary construction and storage compounds (**Figure 4.11a-b);**
- Borrow Pits (as described above and shown in **Figures 4.12 a-e**);
- Proposed Grid Connection Route (**Figure 4.13**); and
- Construction Programme (**Figure 4.14**).

Micrositing

4.5.10 In carrying out the various surveys that are necessary in advance of construction activities, environmental, geotechnical and health and safety sensitivities might be identified that could be avoided if the locations of turbines or tracks are re-sited to a relatively small degree (i.e. 'micro-sited'). It is therefore proposed that some flexibility for infrastructure micro-siting be retained and that appropriate limits of deviation would be up to 50m for turbines and 100m for internal wind farm tracks and other infrastructure such as substations and compounds. This mitigation may be restricted further in terms of specific locational hard constraints such as not mircositing closer to a water course if within 50m of a water course or not encroaching beyond the agreed Fresnel zone of microwave links.

Wind Turbines

4.5.11 The turbines of the Proposed Development would be three bladed variable speed pitch regulated, with the rotor and nacelle mounted on a cylindrical tower. This is a typical modern, horizontal axis design comprising four main components: a rotor (consisting of a hub and three blades); a nacelle (containing the generator and also often a gearbox) to which the rotor is mounted; a tower; and a foundation. The specific choice of wind turbine to be installed (henceforth called the 'reference turbine') is dependent on the final commercial and technical choice by the wind farm developer but would not exceed the physical parameters specified in the consent. The chosen turbines would have a height to blade tip of up to 156m or 180m, as per **Table 4.1** and an example of a typical turbine is shown on **Figure 4.2**.

4.5.12 Wind turbines convert the kinetic energy of the wind into electrical energy, the air passing over the blades causing them to rotate. This low speed rotational motion of the blades is converted into electrical energy by a generator located inside the nacelle at a nominal voltage of 690V.

4.5.13 A transformer located immediately adjacent to the turbine tower in a small kiosk (typically 3m x 2m x 3m) steps up the voltage which is then fed to the control building via underground electrical cabling linking all of the turbine unit transformers. Some turbine options may allow transformers to be incorporated into the nacelle, or into the base of the tower itself. An external kiosk is more likely and therefore has been considered by this assessment as a worst-case assessment. The electricity generated by the Proposed Development would be metered and fed into the electricity transmission network to which it is connected.

4.5.14 The hub height and rotor diameter may vary depending on the final turbine type selected following competitive tender. For the reference turbine used to inform this assessment, an indicative 5.6MW machine has been considered. The blades would rotate at approximately 5 to 13 revolutions per minute, generating power for all wind speeds between a cut in speed of approximately 4m/s

(9mph) and 25m/s (56mph), though these parameters may vary slightly depending on final turbine selection. Based on current technology, at wind speeds greater than 35m/s (126kph or 78mph), the turbines would shut down for self-protection. Wind data to inform final turbine design and selection is being gathered using temporary anemometry masts.

4.5.15 The design process has considered an appropriate colour for the wind turbines. They would be painted in a neutral colour (colour specification, light grey RAL 7035) with a semi-matt finish so as to minimise the visual intrusion. Note however that the montages supporting **Chapter 6: Landscape and Visual Impact** are shown in white to ensure adequate contrast in the imagery. The components for each turbine would be brought to the Development Site separately, with the towers being delivered in three or four sections. The overall assembly process for each turbine takes approximately two to four days, depending on weather conditions.

4.5.16 The construction typically involves the use of a small auxiliary 200 tonne crane for vehicle off-loading components from delivery vehicles before preliminary assembly. A larger crane, approximately 500 tonnes lifting capacity, possibly with a 100-tonne trailing crane would be used to erect the base and mid towers. Once preliminary assembly has been completed, a larger main-lift crane, approximately 1750 tonnes lifting capacity and a 100-tonne trailing crane would be used to erect the top tower section, nacelle including generator, hub and blades.

4.5.17 Once the turbines are in operation, they would be monitored remotely and would not be permanently staffed. Maintenance personnel would make routine visits by car or van approximately once a month, with intermediate visits as and when necessary.

4.5.18 Major planned maintenance would be carried out periodically throughout the year.

Wind Turbine Foundations

4.5.19 Detailed geotechnical investigations would be undertaken during the enabling works to establish the nature of the formation condition at each turbine location. It is anticipated that foundations at the Development Site would be a rock anchor foundation system. Where this is not possible, the traditional, gravity foundation design would be implemented. This approach would be implemented to minimise peat removal and significantly reduce the amount of concrete required, thereby minimising environmental impacts as much as possible.

4.5.20 The construction methodology for wind turbine foundations would depend on the strength of subgrade material and depth of peat specific to each proposed location. Based on current knowledge, it is anticipated that 8 gravity base foundations and 27 rock anchor /cage foundations could be required for the Proposed Development, and the following assessment has therefore been based on this design envelope.

Rock Anchor/Cage Foundation

4.5.21 Rock Anchors were developed for sites where bedrock is close to the surface, allowing the loads from the turbines to be directly transferred into the bedrock utilising the strength of the rock, rather than using the foundation to take the load. Further development of Rock Anchor technology has resulted in rock anchor cages allowing the bedrock at slightly lower lying bedrock to be accessed. Both forms of rock anchor are the same diameter as the tower and therefore any excavation required for digging down to expose the rock head is minimised. For the Rock Anchor, once the rock is exposed and levelled off, a steel adapter plate is installed on top of the rock, with post-tensioned anchors drilled through the plate down up to 15m into the rock. For the Rock Cage, once the rock is exposed and levelled off, the steel cage is installed on top of the rock, with post-tensioned anchors drilled through the base of the cage down into the rock. An example of a rock anchor design is shown in **Figure 4.4**. The area surrounding the rock anchor foundation would be finished in the same way as described for the gravity foundation base set out below.

4.5.22 Different types of rock anchor foundation may be required depending on the depth of the excavation. It is anticipated that around 50m^3 of concrete would be required for the shallower rock anchor foundation, and around 200m^3 for the deeper rock anchor cage foundation.

Gravity Foundation

4.5.23 Foundations would need to be taken down to competent bearing strata, which means excavating through the peat and founding on either bedrock or glacial till. In general, standard excavation techniques would be adopted if peat is shallow and/or stable. However, if peat is unstable or not able to form a stable face, a rock cofferdam would be installed around the perimeter of the foundation to retain the peat and prevent it from flowing back into the excavation.

4.5.24 Whilst the foundation excavation is open it would need to be kept free of water to allow construction of the reinforced concrete base. Water ingress would potentially be from ground (from exposed faces, via peat), surface and rain water. The foundation excavation would be designed to be gravity draining where local topographical conditions allow. If this is not possible, the excavation would be dewatered by pumping. The discharges from dewatering operations would be subject to a method statement agreed with the ECoW and SEPA. Where necessary, settling ponds, filter treatment facilities and buffer strips would be installed to remove sediment from pumped water. No water from foundation dewatering operations would be discharged directly into a watercourse.

4.5.25 The use of a gravity type foundation would involve the excavation and removal of material down to a suitable load bearing strata. Should suitable formation not be present, ground replacement via back filling with compacted stone would be carried out to build up the formation level. A circular reinforced concrete foundation would then be constructed, extending out to approximately 11.5m radius (23m diameter) from the turbine base (as illustrated in **Figure 4.3**). It is expected that approximately 575m^3 of concrete would be required for each of the gravity base foundations.

4.5.26 The foundation construction would involve the placing of shuttering and steel reinforcement followed by the pouring concrete within the shuttering to form the base *in situ*. The upper surface of each base would finish approximately 1m below ground level, with the central pedestal extending above existing ground level to receive the bottom tower section. Selected suitable excavated material would be compacted in layers on top of the concrete foundation to leave approximately 150mm above ground level. Around the base of the tower a 2m wide stone footpath would be constructed to allow access.

4.5.27 Removed topsoil and vegetation would be stored adjacent to the foundation and later used to cover areas which have been backfilled. Material needed for backfill would be compacted and stored temporarily in bunds adjacent to the excavations until required.

Crane Hardstandings

4.5.28 Areas of hardstanding would be constructed adjacent to the turbines to create a stable base for assembly cranes. Each area would consist of an excavated crushed stone hardstanding with approximate dimensions of 50m by 25m. A typical arrangement is illustrated on **Figure 4.5**. Each hardstanding would be approximately 1,250m^2 in area, with the exact arrangement being modified to suit the specific requirements of the turbine, the crane and local topography.

4.5.29 Vegetation surrounding turbines would be managed if it has potential to interfere with lifting equipment.

Internal Wind Farm Tracks

4.5.30 Approximately 28.7km of new internal wind farm tracks would be required for the Proposed Development. These tracks would form the link between the public road and the individual turbines, and would be 5m wide on the running surface. Temporary passing places (58 no. up to 33m x 4m) would also be provided every 500m (or as required) to facilitate traffic movements. Potentially the main routes could have been 10m wide to facilitate two-way traffic for stone wagons, however this would require an increased use of materials and peat excavation, therefore strategic passing places were considered to be more appropriate.

4.5.31 Turning heads would be provided at the termination of each turbine string. Abnormal vehicles and cranes would use these turning heads to perform an about turn during the turbine delivery and assembly processes. Where a single turbine is located on a spur track close to the main central track and the topography is suitable, the abnormal vehicles would reverse to the junction with the main track to complete an about turn.

4.5.32 Four site entrances are proposed; two main entry points from the A859, and two on the unclassified road (Pentland Road) where the site tracks meet the road and cross it.

4.5.33 The tracks would be floated normally where the peat depth is greater than 1m, otherwise the tracks would be excavated and backfilled. Submerged drainage pipes would be installed across excavated tracks where hydrological sensitivities are present. A section drawing of two typical floating road/track construction methodologies (option A and option B) is given in **Figure 4.6** and, for a standard excavated road, in **Figure 4.7**.

4.5.34 Where a floating track (**Figure 4.6** option A) is to be constructed, geogrid and geotextiles would be laid, and crushed stone would be layered on this to the required depth by excavator machinery. Where any floating road meets an excavated section (such as a compound or crane hardstanding), long lap lengths of geogrid would be installed at the interface. The average stone depth of the tracks would be approximately 0.7m. The main spine road would require the greatest depth of stone (about 1m, dependent on bearing) and spur tracks to individual turbines would be shallower at approximately 0.6m, although this would be determined by the strength of the underlying peat. The stone would be compacted by mechanical excavator as the use of vibratory compaction is not recommended on floating roads. In areas of sensitivity, such as groundwater dependent terestrial ecosystems (GWDTE's), cross drainage under the tracks may be required to maintain water flow.

4.5.35 A second floating road construction methodology is also considered, whereby it is proposed to excavate up to two thirds of catotelmic peat where present (see **Figure 4.6** option B). A suitable volume of oversize clean rock would then be placed into the remaining catotelmic peat allowing this peat to fill the interstitial voids between the rocks before the access track is laid. Further details will be provided in the CEMP that would be produced for approval by the Scottish Environment Protection Agency (SEPA) prior to construction.

4.5.36 The floating tracks would be constructed in line with the good practice guidance and would include the use of geogrids.

4.5.37 A desk study, site walkover, peat landslide risk assessment and peat and geotechnical risk assessment have been undertaken for the Development Site. Peat depth (probing) works and auger works (to identify peat classification) have contributed to these studies. A range of design measures have been undertaken to minimise the extent of works on areas of deep peat, principally involving the alignment of tracks and wind farm components to avoid such areas (alongside other site constraints) where possible. Consideration is given to the techniques recommended in the guidance document Floating Roads on Peat[1]. Consideration of the impacts upon soils and suitable mitigation measures is presented in **Chapter 11: Geology, Hydrology and Hydrogeology**.

Water Crossings

4.5.38 There are a large number of small streams, larger watercourses and drainage channels present throughout the Development Site and a small river, Abhainn Ghrioda, over which a new crossing is proposed. The detailed assessment of impacts upon the water environment is presented in **Chapter 9: Ecology and Chapter 11**. The following sections briefly describe the types of water crossings that would be employed.

4.5.39 Access tracks have avoided crossing watercourses where possible, but due to the number of watercourses on the Development Site, and limitations regarding access locations, it is not possible for the development to take place without some being crossed. In addition, there are some preferential flow pathways that do not have clear surface water channels (e.g. where subsurface flow occurs or flow is ephemeral) where the method of crossing has also been considered to ensure that flow paths are not disrupted. The appropriate method of watercourse crossing has been selected based on the topography, hydrology and ecology of each watercourse individually.

4.5.40 Two main types of watercourse crossing are proposed for the development: bridges and culverts. However the use of each of these types of structures would be determined individually to minimise potential effects based on a site-specific assessment, which would account for topographic, hydrological and ecological attributes at each proposed crossing point. All watercourse crossings would be designed in accordance with the SEPA Good Practice Guide for the Construction of River Crossings and, where culverts are required, they will be designed in accordance with the CIRIA Culvert Design and Operation Guide.

4.5.41 Based on the proposed road layout and knowledge of the site and watercourses, it is anticipated that four single span bridge crossings would be required, and the remaining 12 crossings would be culverts.

4.5.42 All river crossings would be designed to convey a 1 in 200-year return period flood event, and individually sized and designed to suit the specific requirements and constraints of its location. As noted above it is probable that additional crossings would be identified on site during construction, or the proposed crossing may change. All crossing points and methodologies would be agreed with all relevant stakeholders, prior to construction.

Bridges

4.5.43 Bridges in general are the preferred solution for the larger required watercourse crossings due to their lesser hydrological and ecological effects and are particularly suited to larger spans and to higher flow watercourses. Bridge construction is unlikely to interfere with the watercourse to the same extent as culvert construction and can be built over the existing alignment of the river without the need for diversion. The bridge would carry ducts that would accommodate site electrical cables. Foundations will be required on both banks (down to a competent bearing stratum) in order to support the bridge deck. A typical bridge section is shown in **Figure 4.8.**

4.5.44 A local widening of the track would be required on one side of the bridge; if necessary the track will need to be strengthened to allow a hardstanding area for the crane when the bridge deck beams are lifted into place. The size of this area would be determined by factors governing the size of the crane, for instance the bridge span.

[1] 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, Forestry Civil Engineering and Scottish Natural Heritage, August 2010.

Culverts

4.5.45 Culverts are proposed where there are small but distinct channels with no clear topographic variability. The small size and channel capacity limit the hydrological and ecological benefits that a bridge would bring, while the lack of topographic variation would make bridge design unfeasible.

4.5.46 Culverts would be designed to meet minimum requirements as set out in CIRIA Culvert Design and Operation Guide (C689). The size of the culvert would be determined by the design flow of the watercourse and its gradient at the point of crossing. Small circular culverts would be used where a small watercourse or stream needs to be crossed, and the river crossing is deemed to have low environmental sensitivity. A typical section is shown in **Figure 4.9,** the construction technique would be site specific, either the watercourse would be temporarily diverted, whilst the culvert is constructed on line, or the watercourse would be diverted to a new alignment through the structure. When installing culverts in streams, culverts would be full pipes where the base would be covered with a natural bed. The riverbed would be recreated through the length of the culvert to keep the watercourse flowing as naturally as possible. A mammal tunnel, if judged necessary by the ECoW following further pre-construction surveys, would be provided so that no restriction is created to established movement routes.

Electrical Connection and Battery Storage

4.5.47 Following turbine foundation construction, some of the required electrical infrastructure would be installed such as the small transformers to be located either internally within the turbine towers or adjacent to each turbine in a small kiosk (3 x 2m x 3m) according to the selected turbine specification.

4.5.48 The onsite power cable network would be installed adjacent to wind farm tracks in a trench around 0.5m wide and at a depth of approximately 1m. Where depths less than 1m are to be adopted, possibly as a result of rock head or groundwater, or where the cables go underneath the site roads at crossing points then the cables would be installed in cable ducts.

4.5.49 The power cables will be XLPE (cross linked polyethylene) insulated with copper or aluminium conductors. A separate fibre optic cable would be laid alongside the power cables within the same trench for communications. A bare copper earth cable would also be laid at the bottom of the same cable trench.

4.5.50 The turbines would be connected through suitable switchgear to be installed in a control building on-site. The substation compound would comprise a hardstanding with maximum dimensions of approximately 150m x 80m and a single storey building approximately 37m x 10m which will house switchgear, metering, protection and control equipment, battery storage facilities (for up to 20MW of storage) as well as welfare facilities. **Figure 4.10** provides an illustration of a typical control building and compound. Final details including external finishes would be submitted pursuant to a condition of the deemed planning permission should consent be granted. The envisaged location of the control building and the main site compound are shown in **Figure 4.1**.

4.5.51 Two secondary substation compounds, measuring 80m x 80m with a height of up to 6.6m would also be constructed to enable the electricity generated onsite to be stepped up in order to reduce onsite transmission losses.

4.5.52 The Proposed Development would be connected into the national grid transmission system at 132kV. This connection from the on-site substation is expected to be achieved using a buried cable to the Scottish Hydro-Electric Transmission Ltd (SHETL) transmission network. The electricity would be exported to the grid via the proposed Western Isles Interconnector, which SHETL are progressing as a separate project. The HVDC Converter and AC substation is expected to be located at Arnish Point, approximately 5km to the south of the Development Site substation.

4.5.53 The anticipated grid connection route is illustrated on **Figure 4.13**.

Construction Compounds

4.5.54 A temporary site office comprising a portacabin, a single parking space and a vehicle layby would be located approximately 150m east of the Development Site entrance. This office would be manned during construction hours and provide a sign-in/out function for the Development Site. This would prevent unauthorised vehicular access to the Development Site and allow supervision of anyone remaining on-site beyond agreed working hours.

4.5.55 The location of the main construction compound is illustrated on **Figure 4.1**. This would be a maximum of 150m by 80m in area but this may be reduced depending on site requirements at the start of the construction phase. The plans and elevations of the compounds are illustrated on **Figure 4.11a-b**.

4.5.56 Three smaller satellite compounds (**Figure 4.11b**) would be located in the south, central area and north of the Development Site and would be 100m by 100m, as illustrated on **Figure 4.1**. These would function as auxiliary compounds for the site works and would provide space for office and welfare facilities and also serve as a vehicle depot and material storage area.

4.5.57 The construction compounds would be of an excavated construction. The peat would be removed to an average depth of approximately 800mm (depending on the ground conditions encountered during the geotechnical investigations), and then replaced with a geogrid membrane layer, on which layers of crushed rock would be compacted and finished with a final layer of finely graded material to act as a top dressing. On average 800mm depth of stone would be used as fill.

4.5.58 Once the erection and commissioning of the wind turbines is complete, the main construction compound would be removed and the land reinstated.

Site Security and Lighting

4.5.59 The construction compounds would be lit with security lighting, which would face inwards to minimise light pollution. The construction compound may be enclosed within a security fence around the perimeter of the substations and the access to electrical compounds would be via a locked access gate.

4.5.60 It is also anticipated that a small security area would be established at the junction to the public highway during the construction period. These would be manned to monitor the flow of traffic into and out of the Development Site with a small manned security kiosk installed.

4.5.61

Proposed Working Hours

Development Timescales and Programme

4.5.62 It is anticipated that the construction period for the Proposed Development would be approximately 30 months in duration (month numbers relate to the construction programme and not calendar months) and would comprise the following activities broadly listed in sequence:

- Improvement works to the public highway to accommodate turbine deliveries (e.g. widening at junctions);
- Construction of four site access points;
- Formation of site compound(s) including hardstanding and temporary site office facilities;

- Construction of new access tracks and passing places (as required), inter-linking the turbine locations and substation compound(s);
- Construction of bridges where required;
- Construction and upgrade of culverts under roads to facilitate drainage and maintain existing hydrology;
- Construction of crane hardstanding areas;
- Construction of turbine foundations;
- Construction of site control building and associated substation(s);
- Excavation of trenches and cable laying adjacent to site tracks;
- Connection of on-site distribution and signal cables;
- Delivery and erection of wind turbines;
- Commissioning of site equipment; and
- Site restoration.

4.5.63 Where possible, operations would be carried out concurrently (thus minimising the overall length of the construction programme). In addition, development would be phased such that, at different parts of the Development Site, the civil engineering works would be continuing whilst wind turbines are being erected. Site restoration would be programmed and carried out to allow restoration of disturbed areas as early as possible and in a progressive manner.

4.5.64 Floating road construction for access tracks would be scheduled to take account of predicted settlement rates, with monitoring undertaken to ensure their stability.

4.5.65 An indicative programme for construction activities is shown in **Figure 4.14.** The start date for construction activities is largely dependent upon the date that consent might be granted and grid transmission availability; subsequently the programme would be influenced by constraints on the timing and duration of any mitigation measures confirmed in the individual technical chapters or by the application decision.

4.5.66 The final length of the programme would be dependent on seasonal working and weather conditions. Summer months are favoured for construction due to longer periods of daylight allowing longer (and safer) working days. Summer months are generally also drier which aids construction progress and reduces the impact of site debris (mud etc) reaching the public highway, although wheel wash facilities would be installed at the main site entrance / exit points. Wet weather has the potential to complicate construction activities in peat, although these complications can be minimised through the use of 'stop rules' included in the CMS (see **Section 4.7**).

4.5.67 For the purposes of this EIA Report, subject to the caveats noted below, construction activities have been assumed to take place between 07:00 to 19:00 hours on week days and 07:00 to 13:00 on Saturdays. Quiet on-site working activities such as electrical commissioning have been assumed to extend outside the core working times, noted above, where required. No working will be undertaken on Sundays. Working hours may be reduced at times due to seasonal or weather restrictions or in certain locations where required as mitigation (for example during the breeding bird season should a stand-off from an active nest be required).

4.5.68 Weather, in particular wind, has a strong influence on the timing of construction activities. Crane activities are generally limited during strong winds (>9 m/s) and erection during these weather conditions may be avoided for safety reasons, with the actual limiting conditions being reviewed as part of the crane lifting plan. As a result of this, it may be necessary to carry out turbine erection activities outwith the standard working times and during periods of calm weather. During periods of cold weather, concrete pouring of the turbine bases may be prohibited (temperatures <4°C) or subject to specific cold weather working practices.

Development Phasing

4.5.69 Construction of the Proposed Development would consist of two main elements. Firstly, civil and electrical construction of the infrastructure and secondly, erection and commissioning of turbines. Construction of the control building and the grid connection are lengthy processes which will commence early in the construction programme to allow a live grid connection to coincide with the commissioning of the turbines. As noted, many individual construction processes will run partly or fully concurrently whilst others would progress in a sequence with or without some overlap in time.

Site Quantities

Rock Requirements

4.5.70 It is estimated that the construction of access tracks, hardstandings, foundations, and compounds of the Proposed Development would require approximately 194,077m^3 of rock. **Table 4.3** below provides a breakdown of the required rock volumes for each construction element. It is anticipated that all of the rock required would be sourced from the on-site borrow pit(s)[2].

Table 4.3 Rock Volumes

Infrastructure	Total Rock Volume (m^3)
Turbine Hardstandings and foundations	50,793
Access tracks	102,804
Temporary compounds	25,200
Substation compounds	15,280
Total Rock Volume	194,077

Concrete Batching Plants

4.5.71 For the purpose of this application and EIA it has been considered that all concrete would be sourced off-site and there will be no on-site batching required.

4.5.72 For the purposes of the assessment concrete batching plant has been assumed to be from the Marybank Quarry location, although could be from one of the other on-island suppliers with no additional adverse effects.

4.5.73 The majority of the concrete used on the Development Site is required for turbine foundations with additional material for substation and transformers. **Table 4.4** provides an estimate for each.

[2] It should be noted that for completeness, the traffic and transport assessment consider this scenario and a scenario whereby no borrow pits being possible on the Development Site.

4.5.74 As set out in **Section 4.5**, the assessment has been based on a design envelope of 11 gravity base foundations, 16 rock anchor foundations and 8 rock cage foundations.

Table 4.4 Concrete Volumes

Infrastructure	Total Concrete Volume (m^3)
35 Wind Turbine Foundations	8,725
Substation Foundations	222
Wind Turbine Transformer Foundations	189
HV Equipment Plinths	270
Total Concrete Volume	9,406

4.5.75 Other materials associated with the construction, operation and decommissioning will be sourced locally where possible.

Employment Proposals

4.5.76 Potential job creation levels are discussed in detail in **Chapter 14: Socio Economics.**

Transport Movements

4.5.77 As mentioned in **Section 4.6**, it is anticipated that construction of the Development Site would take up to 30 months to complete. The schedule shown in **Figure 4.14** illustrates works in line with a 30-month construction period (month numbers relate to the construction programme and not calendar months).

4.5.78 The vehicles likely to be involved in construction activities include:

- Articulated trailer lorries – to bring initial establishment equipment (port-a-cabins etc.);
- Low loaders – to transport the civil construction equipment to and from the site;
- Tipper trucks – to import any aggregates required during construction (e.g. engineering fill for turbine foundations) and to move stone for track construction and remove spoil (these would be retained on site during construction);
- Concrete mixers wagons –to transport concrete from the offsite batching source to location of turbine bases and substations;
- Cranes – typically this involves one 100 tonne trailing crane, one 200 tonne crane for assembling the turbines on the ground and one 1000 tonne maximum lifting capacity crane plus three support vehicles for the period of turbine erection. The final turbine choice may have specific requirements for alternative crane types;
- Specialist delivery vehicles for delivery of turbine blades, tower sections and nacelles; and
- Miscellaneous vehicles and handling equipment, including cars belonging to the construction workforce.

4.5.79 Anticipated vehicle movements on the public road network are detailed in **Appendix 13.B** and assessed in **Chapter 13: Traffic and Transport**. **Table 13.10** sets out the worst case scenario for the predicted traffic generation during the construction phase (i.e. not using borrow pits).

4.5.80 **Appendix 13.B** summarises the predicted traffic movements associated with each type of vehicle during the construction phase. Month numbers relate to the construction programme and not calendar months.

4.5.81 Turbine deliveries are anticipated in phases, based on the construction programme schedule and are likely to be subject to movement orders as agreed with the local authority and other relevant statutory bodies.

4.5.82 During the delivery periods when the turbine components would be entering the Development Site, long and slow loads would use the local road network. Traffic management measures incorporated into a TMP would be employed to mitigate potential adverse effects on road users. Typically turbine components are delivered in convoys of up to 6 vehicles and travel during off-peak periods of traffic flow.

4.5.83 The largest component of vehicle numbers during main construction works is due to non-HGV movements, in particular concrete delivery and stone (if imported).

4.5.84 A TMP would be produced and submitted pursuant to a condition of the deemed planning permission.

4.5.85 Once the turbines are in operation, minimal vehicle traffic would be required to access the Development Site. The turbines would be monitored remotely and require only routine maintenance visits.

4.5.86 An assessment of the impacts arising from traffic on ornithology and ecology is presented in **Chapter 8: Ornithology and Chapter 9** and consideration of the impacts arising from project traffic increases upon the local road network and users is presented in **Chapter 13**.

Offsite Development

4.5.87 As discussed in **Section 4.3**, some modifications to the Arnish Port road might be required to allow for the delivery of the turbine components, however they would be the subject of a separate planning application and therefore not considered further in this Application.

4.6 Decommissioning

Wind Farm Decommissioning Requirements

4.6.1 There are two options available at the end of the operational lifetime of the Proposed Development. As wind energy is a renewable resource and thus a sustainable method of generation, the first is to re-power the site with new machines, which would require a new application and a further EIA Report. The second option is to remove the wind turbines and re-instate the Development Site.

4.6.2 In any event, a decommissioning plan is required for the removal of the Proposed Development.

4.6.3 If consent is granted, LWP believe that there is likely to be a planning condition that the wind turbines are removed after a period of operation of 25 years. Wind turbines can easily be removed and the hardstanding areas re-instated. Prior to wind turbine removal, due consideration would be given to any potential impacts arising from these operations. Some of the potential issues could include:

- Potential disturbance by the presence of a crane, HGVs and engineers on-site;
- On-site temporary compound would need to be located appropriately;
- Time of year and time-scale (to be outside sensitive periods); and
- Access tracks may remain in use for the benefit of the landowner, crofters and other stakeholders.

4.6.4 A comprehensive plan for the decommissioning (including environmental management practices) of the Proposed Development and restoration plan of the Development Site on completion of decommissioning works would be prepared for agreement with CnES. The decommissioning plan would be prepared near the end of the operational life of the Proposed Development to decommissioning the Development Site and restore the landform after removal of the above ground infrastructure.

Wind Turbine Decommissioning

4.6.5 Wind turbines (towers, nacelle, hub, blades and electrical kiosk) can be dismantled using a crane and removed from site. Most parts can be readily recycled with the only parts which are currently difficult to recycle being the glass fibre blades. Most items would be broken down so that specialist lorries are not required unless there is a potential follow on use for the components in one piece.

4.6.6 The wind turbine foundations would be cut off to a depth of approximately 1m and the remainder left in situ and covered by 1m of soil / peat, which would be reinstated and re-vegetated, this being more environmentally sensitive than removing foundations.

Substation and Distribution System Decommissioning

4.6.7 The control building, substation and associated equipment would be removed and the components reused or recycled. It is likely that the plant would be re-used as it has a life well in excess of the Proposed Development itself. The buried distribution cables would be de-energised and would be cut off below ground level at the ends. Any disturbed areas would be reinstated and re-vegetated.

Access Track Decommissioning

4.6.8 Following decommissioning of the Proposed Development, some wind farm tracks may remain in perpetuity for future use by landowners, crofters, other stakeholders and for recreational purposes. It is also considered that the disturbance associated with their removal and disposal of the material would have a much greater environmental effect than leaving them in situ

Transmission System Decommissioning

4.6.9 There may well be other users of the wider transmission system at the end of the project. It may be integrated with the transmission network on Lewis and other electricity generators may be connected to it. In this case, the relevant circuits would not be removed when the Proposed Development is decommissioned.

4.7 Embedded Environmental Measures

Introduction

4.7.1 A key benefit of the EIA process is the opportunity it gives to integrate environmental considerations into the careful, iterative design of a project. Embedded mitigation proposals are those mitigation measures which are inherent to the Proposed Development and are integral to and should be included in consideration of the application. Embedded mitigation includes all mitigation assumed to be in place during construction, operation and decommissioning. Embedded mitigation is generally regarded as industry standard or best practice.

4.7.2 Embedding mitigation has been a feature of the process that has led to the final design of the Proposed Development; and this embedded mitigation therefore forms part of the Proposed Development which is assessed.

4.7.3 In addition to the plans and management plans described in **Section 4.4**, the following provides an overview of some of the general (currently not project specific) environmental management considerations for the construction of the Proposed Development. This is supplemented by specific environmental management practices set out in relevant guidance, described in greater detail in the relevant appendices of **Volume 4**. These provisions do not replace or affect the implementation of specific mitigation measures detailed in the specialist assessment chapters which follow.

Construction Environmental Management Plan (CEMP)

4.7.4 The CEMP would be the master document for consolidating all environmental requirements and undertakings that relate to the Development Site. The CEMP would include the schedule of mitigation set out in this EIA Report and the undertakings that emerge from any individual management plans which may be produced for the project, such as a Habitat Management Plan, Waste Management Plan, Peat Management Plan, Surface Water and Silt Management etc, and would be the central document for environmental provisions and protections when producing detailed designs for construction method statements. It would be the main document used by the Environmental Clerk of Works (ECoW) when carrying out audits of planning and environmental compliance.

4.7.5 The CEMP would remain a live document throughout the pre-construction and construction processes and some provisions are likely to extend into the operational phase. The CEMP would consolidate all appropriate mitigation and enhancement strategies, and would clearly outline what should be implemented, where, and by whom.

4.7.6 The CEMP would be produced prior to the commencement of works and made available to the appointed civil engineers and construction company, and its objectives would be to:

- Provide a mechanism for delivering many of the embedded environmental measures described in the EIA Report;
- Ensure compliance with legislation through setting out the need for consultation with ‘consultation bodies’ (as defined in Regulation 2 in the EIA Regulations), and by obtaining necessary consents and licences from relevant bodies;
- Provide a framework for monitoring and compliance auditing and inspection to ensure the environmental measures included in the scheme are being implemented;
- Ensure environmental good practices are adopted throughout the construction stage;
- Provide a framework for dealing with adverse effects as they occur;
- Ensure a prompt response should unacceptable adverse effects be identified during the works.

Construction Method Statement (CMS)

4.7.7 The CMS would be prepared following the grant of consent and be subject to approval with individual elements and the supporting CEMP, Pollution Prevention Plan (PPP), Pollution Incident

Response Plan (PIRP) and SWMP expected to require approval by relevant consultees. The proposed content of the CMS is as follows:

- GI methods including appropriate reference to CEMP, PPP, PIRP and SWMP;
- Turbine and infrastructure locations (including borrow pits) following post GI micro-siting involving a number of technical specialists - see **Section 4.5**;
- Good practice guidance relevant to H&S, design details etc (e.g. CIRIA "Culvert Design and Operation guide) - see **Section 4.5**;
- Design detail for infrastructure (e.g. foundation specification, foundation and crane hardstanding configuration, confirmation of road sections to be excavated and roads sections to be floated, borrow pit locations and dimensions, watercourse crossing type and dimensions, bell mouth junction design, external finish to buildings, security fencing form and location, etc) - see **Section 4.5**;
- Design detail for pollution control measures (location specific arrangements and design for management of dewatering activities) - see **Section 4.5**;
- Material import requirements and confirmation of stone and concrete source - see **Section 4.5**;
- Programme of works and working hours controls -see **Section 4.5**;
- PPP and PIRP - see below;
- SWMP - see below; and
- Site restoration plan to be implemented to restore areas affected by construction activity.

Peat Management Plan

4.7.8 A detailed Peat Management Plan (PMP) would be produced and agreed with CnES in consultation with SEPA in advance of the commencement of development. The PMP would address how peat would be removed from working areas, stored and reinstated. Further details on the outline PMP is set out in **Appendix 9H**.

Transport Management Plan

4.7.9 A detailed Transport Management Plan (TMP) would be produced and agreed with CnES in advance of commencement of development. The TMP would address traffic related planning conditions and would include, but not be limited to:

- Communication – The TMP would include a strategy for communication with local residents and businesses. The strategy would include procedures to keep affected parties aware of when works would be carried out, if / when roads would be closed (and diversionary routes to be used if there are closures) and how to contact the construction team with a query or complaint;
- Traffic Management – Detailed traffic management strategies would be provided for each stage of the construction works alongside finalised road traffic signage arrangements and a proposed programme of safety inspections on the public highway. This would include details of proposed timings of deliveries and transportation during the construction period;
- Road Condition Survey pre and post construction;

- Remedial Works – Details of procedure for conducting emergency road maintenance, on-going remedial work and final remedial work along with an agreed maintenance period for any repairs carried out on the public road; and
- Contact and Liaison – Details would be outlined with respect to road safety and condition monitoring, including a named individual who would be responsible for liaising and coordinating with CnES.

Water Management Plan

4.7.10 A Water Management Plan (WMP) would be produced and agreed prior to the commencement of development. The WMP would provide specific information in relation to the management of water on the construction site. Practices set out in the WMP would be incorporated into the project CEMP once agreed. This would draw on the specific mitigation measures set out in **Chapter 11**.

Habitat Management Plan

4.7.11 A Habitat Management Plan (HMP) (**Appendix 9I**) would be produced and would include the location and approach to implementing ecological and other enhancements and mitigation where applicable.

Pollution Prevention Plan and Pollution Incident Response Plan.

4.7.12 A PPP and PIRP would be prepared and subject to consultation with SEPA and SNH in advance of any construction activities and implemented as part of the overall CEMP. This would set out site management and working practices and draw heavily upon SEPA's Pollution Prevention and Control Guidelines (PPGs). Construction methods and storage of materials at borrow pits will strictly adhere to the Plan.

4.7.13 Aspects of pollution prevention are inherent in the design process and form of infrastructure as described under the CMS above as well as being addressed in general terms through general environmental management as described under the CEMP above.

4.7.14 Good practice guidance would be adhered to (e.g. SEPA guidance "Pollution Prevention and Control Guidelines").

Dust and Air Quality

4.7.15 Particular care would be required to maintain dust emissions at a practicable minimum when working in the vicinity of residential properties and environmentally sensitive areas. Good practice mitigation would be required during dry conditions. The use of Best Practicable Means (as defined in Part III of the Environmental Protection Act 1990) would be employed.

4.7.16 The environmental measures to be implemented to control dust emissions during construction and decommissioning are:

- The use of dust suppression facilities on-site. This would include the provision of water bowsers with sufficient capacity and range to dampen down all areas which may lead to dust escape on-site;
- Any storage on-site of aggregate or fine material would be properly enclosed and screened so that dust escape is avoided. Adequate sheeting would also be provided for the finer materials which are prone to 'wind whipping';
- Wheel wash facilities would be installed for vehicles entering and exiting the Development Site where required. This facility would be able to automatically clean the lower parts of the

HGVs by removing mud, clay etc from the wheels and chassis in one drive through operation;

- HGVs entering and exiting the Development Site would be fitted with adequate sheeting to totally cover any load carried which has the potential to be 'wind whipped' from the vehicle;
- Good housekeeping or 'clean up' arrangements would be employed so that the Development Site is kept as clean as reasonably practicable. There will be daily inspections of the working areas and immediate surrounding areas to ensure that any dust accumulation or spillages are removed/cleaned up as soon as reasonably practicable;
- The appointment of a contact to whom complaints/ queries about construction dust can be directed. Any complaints to be investigated and action taken where appropriate.

4.7.17 Dust and air quality are not considered any further within this EIA Report because no likely significant effects are anticipated in this regard and have been scoped out of the assessment (**Appendix 2A**).

Site Waste Management

4.7.18 Prior to commencement of works, a detailed SWMP would be submitted pursuant to a condition of the deemed planning permission. It would set out procedures for handling all waste arising from the Proposed Development. Typically this would involve a three stage process:

- A description of each waste type expected to be produced over the course of the Proposed Development;
- Estimations of the quantity of each different waste type expected to be produced; and
- Identification of the waste management action proposed for each waste type including re-use, re-cycling, recovery and disposal.

Re-Use and Recycling of Decommissioned Materials

4.7.19 All decommissioned materials would be stored on site in segregated areas. The principal contractor would provide method statements for the collection, storage and transportation of materials/waste. Where appropriate, materials/waste would be segregated on the Development Site in skips or bunded tanks and transported to appropriate sites or recycling facilities.

4.7.20 No materials would be burned on the Development Site. Hazardous waste would be held in a separate skip (or suitable bunded facility) and disposed of at a suitably licensed site.

4.7.21 No waste would leave the Development Site until the appropriate waste carriers' license and management certificates for the disposal site or transfer station have been inspected and authenticated by the relevant parties.

Control of Hazardous Materials

4.7.22 All hazardous materials and substances stored on the Development Site would be stored in a 'Haz-bin' or similar secure lockable container located within the temporary decommissioning compound.

4.7.23 Control of Substances Hazardous to Health (CoSHH) assessments would be completed by all contractors for activities using hazardous substances.

4.7.24 Any on site facilities for the storage, transportation or refuelling of chemicals, oils or fuels shall be sited on suitable impervious bunds. No discharge to any watercourse, land or underground strata would be permitted.

4.8 Implementation of Embedded Environmental Measures

4.8.1 **Table 16.1** in **Chapter 16: Summary of mitigation measures** summarises the environmental measures that form part of the Proposed Development, as well as the mechanisms which would be used to ensure that these are implemented. Greater detail on these measures can be found in each of the technical assessment chapters.

Monitoring

4.8.2 Monitoring, where it is required, is explained further within the relevant technical chapters.

4.9 References

Constructed Tracks in the Scottish Uplands (SNH, 2013).

Engineering in the Water Environment Good Practice Guide - River Crossings: Second Edition, SEPA, 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, Prepared by: Forestry Civil Engineering & Scottish Natural Heritage, August 2010.

General Guide to the Prevention of Pollution: PPG1, Pollution Prevention Guidelines, Scottish Environment Protection Agency.

General Guide to the Prevention of Pollution: PPG 2, Pollution Prevention Guideline Above Ground Oil Storage Tanks.

Good practice during wind farm construction – A joint publication by Scottish Renewables, Scottish Natural Heritage, Scottish Environment Protection Agency, Forestry Commission Scotland, October 2010.

Pollution Prevention Guidelines: PPG 3, Use and design of oil separators in surface water drainage systems.

Pollution Prevention Guidelines: PPG 4, Treatment and disposal of sewage where no foul sewer is available.

Pollution Prevention Guidelines: PPG5, Works and Maintenance in or Near Water, Scottish Environment Protection Agency.

Pollution Prevention Guidelines: PPG 6, Working at Construction and Demolition Sites, Scottish Environment Protection Agency.

The Pollution Prevention and Control (Scotland) Regulations 2012, Scottish Environment Protection Agency.

5. Legislative and Policy Overview

5.1 Introduction

5.1.1 This chapter describes the legislative and policy background to the Proposed Development. The chapter sets out the legislative basis for a decision by Scottish Ministers and refers to national energy policy and national and local level planning policy which is relevant to the Proposed Development. It also identifies other matters that would be material to the decision by Scottish Ministers. This chapter does not assess the accordance of the Proposed Development with planning policy; a separate Planning Statement has been prepared to support the application and should be referred to for a detailed planning policy appraisal.

5.2 Legislative Context

The Electricity Act 1989

5.2.1 Section 36 of the Electricity Act 1989 provides that a generating station with a capacity in excess of 50MW shall not be constructed, extended or operated except in accordance with a consent granted by the Scottish Ministers.

5.2.2 Paragraph 3(2) of Schedule 9 of the Act requires the Scottish Ministers, in considering any relevant proposals for which their consent is required under Section 36, to have regard to:

- The desirability of the matters mentioned in paragraph 3(1)(a) of the Schedule; and
- The extent to which the person by whom the proposals were formulated has complied with their duty.

5.2.3 The matters mentioned in paragraph 3(1)(a) are: the desirability of preserving natural beauty, conserving flora, fauna and geological or physiographical features of special interest and of protecting sites, buildings and objects of architectural, historical or archaeological interest.

5.2.4 The duty under paragraph 3(1)(b) requires the person who formulated the proposals to do what they reasonably can to mitigate any effect that the proposals would have on the natural beauty of the countryside or on any such flora, fauna, features, sites, buildings or objects. Sub-paragraph 1 applies to an applicant if they hold a generation, transmission, distribution or supply licence at the date a Section 36 application is made, but it is understood the Scottish Ministers apply the same requirement to non-licence holders as a matter of policy.

5.2.5 Paragraph 3(3) of Schedule 9 stipulates a further requirement to seek to avoid as far as possible, causing injuries to fisheries or to the stock of fish in any waters.

5.2.6 The Act does not say that these are the only matters to be taken into account and Scottish Ministers will take into account other matters which would be material to their decision. These will include: national energy policy, national and local planning policy as well as the full scope of the environmental information submitted with the application.

The Town and Country Planning (Scotland) Act 1997

5.2.7 The principal planning statute in Scotland is the Town and Country Planning Act (Scotland) 1997 as amended by The Planning etc. (Scotland) Act 2006 (the Planning Act).

5.2.8 Section 57 of the Planning Act addresses development with Government authorisation. Section 57(2) states that: "*On granting or varying a consent under section 36 or 37 of the Electricity Act 1989, the Scottish Ministers may give a direction for planning permission to be deemed to be granted, subject to such conditions (if any) as may be specified in the direction, for – (a) so much of the operation or change of use to which the consent relates as constitutes development; (b) any development ancillary to the operational change of use to which the consent relates*".

5.2.9 As an application under the Electricity Act, the duty under Section 25 of the Planning Act, to determine the application in accordance with the provisions of the development plan unless material considerations indicate otherwise, does not apply. The development plan is however a relevant consideration.

The Climate Change (Scotland) Act 2009

5.2.1 The 2009 Act is the key legislation in Scotland dealing with climate change and carbon targets. The Act includes an interim greenhouse gas emissions reduction target of at least 42% for 2020 and an 80% reduction target for 2050 against 1990 levels. The Act requires Scottish Ministers to set annual targets for Scottish emissions from 2010 to 2050, consistent with meeting both the interim and 2050 targets.

5.2.10 The Act requires that, as soon as reasonably practicable after setting the annual targets, Ministers publish a report setting out policies and proposals for meeting those targets. This is delivered through the publication of Climate Change Plans. The Scottish Government published its third Climate Change Plan in February 2018, setting out proposals and policies to reduce emissions by 66% by 2032 against 1990 levels (see **Section 5.3.11** below).

5.3 Renewable Energy Policy Framework – Summary

5.3.1 In recent years, European, United Kingdom (UK) and Scottish Government policies have focussed increasingly on concerns about climate change. Each tier of Government has developed targets, policies and actions to achieve these targets.

5.3.2 The targets set for the UK by the European Commission under the EU Renewables Directive (2009/28/EC) include a 16% reduction in UK greenhouse gas emissions by 2020 compared to 1990 levels and for 15% of all energy consumed in the UK to come from renewable resources by 2020.

5.3.3 The above targets were further updated in November 2018 by the European Parliament through the 2030 Clean Energy Package[1]. This came into force in December 2018. The European Parliament have fixed two new targets for the EU for 2030. These are a binding renewable energy target of at least 32% and an energy efficiency target of at least 32.5%. There is a possible upward revision in 2023. It is anticipated that when these policies are fully implemented, they will lead to steeper emission reductions for the whole of the EU than anticipated, some 45% by 2030 relative to 1990 (compared to the previous target of a 40% reduction).

5.3.4 The UK Government retains responsibility for the overall direction of energy policy, although some elements are devolved to the Scottish Government. The UK Government has published a series of policy documents setting out how the European targets can be achieved.

5.3.5 The UK Government established the Climate Change Act 2008 in order to commit the UK to reducing greenhouse gas emission by at least 80% of 1990 levels by 2050. The UK Government soon after also established the UK Renewable Energy Strategy 2009 which set out the path for the

[1] https://ec.europa.eu/info/news/new-renewables-energy-efficiency-and-governance-legislation-comes-force-24-december-2018-2018-dec-21_en

UK to meet the legally binding target of 15% of all energy consumed in the UK to come from renewable sources by 2020.

5.3.6 More recently the UK Government published the Clean Growth Strategy 'Leading the Way to a Low Carbon Future' in October 2017. It makes reference to the 2015 Paris Agreement and states:

"*The actions and investments that will be needed to meet the Paris commitments will ensure the shift to clean growth will be at the forefront of policy and economic decisions made by Government and businesses in coming decades*".

5.3.1 The strategy recognises that meeting the fourth and fifth carbon budget raises challenges, stating:

"*In order to meet the fourth and fifth carbon budgets (covering the periods 2023 – 2027 and 2028-2032) we will need to drive a significant acceleration in the pace of decarbonisation and in this strategy we have set out stretching domestic policies that keep us on track to meet our carbon budgets*".

5.3.7 Whilst the UK has been performing well against its current greenhouse gas reduction targets, it can be seen from the above that there is even more that needs to be done.

5.3.8 The Scottish Government has published a number of policy documents and its own targets. The Climate Change (Scotland) Act 2009 provides the statutory framework for greenhouse gas emissions reductions in Scotland. The 2009 Act requires reductions in greenhouse gas emissions of 42% by 2020 and 80% by 2050, and also provides for annual targets to be set.

5.3.9 The most relevant policy documents published by the Scottish Government include:

- The 2020 Routemap for Renewable Energy in Scotland (2011) and as updated in 2013 and 2015; and the
- The Electricity Generation Policy Statement 2013;
- The Chief Planning Letter to All Heads of Planning 2015;
- The Scottish Energy Strategy 'The Future of Energy in Scotland' 2017;
- The Onshore Wind Policy Statement (OWPS) 2017;
- The Climate Change Plan 2018; and
- The Climate Change (Emissions Reduction Targets) (Scotland) Bill 2018.

5.3.10 Together, these policy documents represent the Government's intended energy and climate change strategy for the period to 2050.

5.3.11 The Climate Change Plan was published in February 2018 and updated Scotland's greenhouse gas emission targets with higher targets (66% emissions reduction, relative to the baseline, for the period 2018-2032). Furthermore, page 46 states "*onshore wind opportunities remain*" and that a role for onshore wind, including island wind, is seen as part of the ambitions in the electricity sector by 2032 (page 68).

5.3.12 Reaffirming the need for onshore wind developments in order to meet Scotland's ambitious energy targets, the Climate Change (Emissions Reduction Targets) (Scotland) Bill was produced in May 2018, requiring a 56% reduction of greenhouse gas emissions by 2020 and a 66% reduction in greenhouse gas emissions by 2030 alongside ambitious targets for 2040 and 2050.

5.3.13 Onshore wind generation in Scotland is identified as 'vital' in the OWPS in order for Scotland to achieve its ambitious renewable energy targets.

5.3.14 Detailed reference to the renewable energy policy context is provided in the Planning Statement.

5.4 National Planning Policy Context

Scotland's Third National Planning Framework (NPF3)

5.4.1 NPF3 is a long term strategy for Scotland. It is the spatial expression of the Scottish Government's Economic Strategy, and of plans for development and investment in infrastructure.

5.4.2 Part of the vision is of Scotland as a low carbon place, where the opportunities arising from the ambition to be a world leader in low carbon energy generation have been seized. NPF3 is informed by, and aims to help achieve, the Scottish Government's climate change and renewable energy targets.

5.4.3 NPF3 acknowledges that the energy sector accounts for a significant share of the country's greenhouse gas emissions, and that addressing this requires capitalising on Scotland's outstanding natural resources, including its significant wind resource. NPF3 makes it clear that onshore wind will continue to play a significant role in de-carbonising the energy sector and diversifying energy supply.

Scottish Planning Policy (SPP)

5.4.4 SPP is Scottish Government policy on how nationally important land use planning matters should be addressed.

5.4.5 It introduces a presumption in favour of development which contributes to sustainable development. Decisions are to be guided by a number of listed principles. These include making efficient use of existing infrastructure, supporting the delivery of new energy infrastructure, supporting climate change mitigation and protecting natural heritage, landscape and the wider environment.

5.4.6 In support of the outcome of making Scotland a low carbon place, SPP signposts the planning system to:

- Support the change to a low carbon economy, including deriving the equivalent of 100% of electricity demand from renewable sources by 2020;
- Support the development of electricity generation from a diverse range of renewable sources;
- Guide development to appropriate locations and advise on the issues that would be taken into account when specific proposals are being assessed.

5.4.7 SPP requires planning authorities to set out in their development plan a Spatial Framework identifying those areas that are likely to be the most appropriate for wind farms. Table 1 of SPP shows the approach to be followed, grouping on the following basis: Group 1 applies to areas where wind farms will not be acceptable (i.e. National Parks and National Scenic Areas); Group 2 applies to areas of significant protection (e.g. other designated areas such as Natura 2000 sites, SSSIs or wild land); Group 3 applies to areas with potential for wind farm development, where it is likely to be acceptable subject to detailed consideration against identified policy criteria. A list of likely considerations for development proposals is provided at paragraph 169 of the SPP. Wind farms should be sited and designed so that impacts are minimised and to protect an acceptable level of amenity for adjacent communities.

5.4.8 More generally, the siting and design of development should take account of local landscape character and applicants should seek to minimise adverse impacts through careful planning and design. Decisions should take account of potential effects on landscape and the natural and water environment, including cumulative effects and planning permission should be refused where the nature or scale of a development would have an unacceptable impact on the natural environment.

Scottish Government Guidance for Onshore Wind Turbines

5.4.9 The Government's 'Onshore Wind Turbines' guidance is part of a suite of web-based advice on renewable energy. The list of 'Typical Planning Considerations in Determining Planning Applications for Onshore Wind Turbines' is similar to that in SPP. The Guidance is dated May 2014.

5.4.10 In December 2014, the Scottish Government released a document answering questions in relation to the SPP and Onshore Wind. The answers provided relate to the following topics: landscape capacity assessment; Spatial Frameworks; separation distances; areas of strategic capacity; cumulative impacts; the life span of wind farms; wild land; scenic routes; and the carbon calculator.

5.5 The Development Plan

5.5.1 The statutory Development Plan applicable to the area within which the Proposed Development is located is the Outer Hebrides Local Development Plan (the LDP)[2], adopted in November 2018 and its associated statutory Supplementary Planning Guidance (SPG).

5.5.2 The Development Plan policies of most relevance are detailed below on a topic basis reflecting the EIA topics. A comprehensive assessment against the Development Plan is provided separately within the Planning Statement. This includes a conclusion on whether the Proposed Development is in accordance with the Development Plan.

Renewable Energy

5.5.3 **Policy EI 8: Energy and Heat Resources** provides guidance on wind energy proposals and is the most relevant policy contained within the LDP. It states that: *"The Comhairle will support proposals that contribute to meeting the targets and objectives of the National Planning Framework 3, the Climate Change Act, and the National Renewables Infrastructure Plan in relation to electricity grid reinforcement, infrastructure and renewable energy generation.*

Development proposals for all scales of onshore wind energy development will be assessed against the Supplementary Guidance for Wind Energy Development.

The Comhairle supports the principle of wind farm development in Areas with Potential for Wind Farms (SG Map 1) subject to a satisfactory assessment against other policies in this plan and the Supplementary Guidance. Many of these areas, particularly in the Uists, will however be constrained by MoD radar. The Supplementary Guidance will give further details of the radar constraints.

The Comhairle will also consider wind farm development in Areas of Constraint, with potential in certain circumstances (Map 1) subject to a satisfactory assessment against other policies in this plan and the Supplementary Guidance.

The Comhairle will not support wind farm developments in Areas Unacceptable for Wind Farms (Map 1).

Proposals for all other renewable energy projects and oil and gas operations (including land based infrastructure associated with offshore projects) will be required to demonstrate all the following:

[2] Outer Hebrides LDP (LDP) [Online] Available at: https://www.cne-siar.gov.uk/planning-and-building/planning-service/development-planning/development-plan/local-development-plan/

a) Appropriate location, siting and design including the technical rationale for the choice of site;

b) No significant adverse impact (including cumulative) on: landscape, townscape and visual aspects; natural, built and cultural heritage resources; the water environment; peatlands; aviation, defence and telecommunications transmitting and receiving systems, e.g., broadband; public health and safety, and amenity (including noise); neighbouring land uses, transport management and core paths;

c) Appropriate decommissioning and site reinstatement arrangements;

d) Phasing arrangements, where appropriate;

e) The contribution towards meeting national energy supply targets and local economic impact…"

5.5.4 Below is a list of policies and SPGs that are considered relevant to the Proposed Development alongside Policy EI 8:

- DS1: Development Strategy;
- PD1: Placemaking and Design;
- PD2: Car Parking and Roads Layout;
- PD6: Compatibility of Neighbouring Uses;
- ED5: Minerals;
- EI 1: Flooding;
- EI 2: Water and Waste Water;
- EI 3: Water Environment;
- EI 4: Waste Management;
- EI 5: Soils;
- EI 7: Countryside and Coastal Access;
- EI 11: Safeguarding;
- EI 12: Developer Contributions;
- NBH1: Landscape;
- NBH2: Natural Heritage;
- NBH3: Trees and Woodland;
- NBH4: Built Heritage;
- NBH5: Archaeology;
- NBH6: Historic Areas;
- Supplementary Guidance: Wind Energy Development.

General Policy Considerations

5.5.5 The LDP includes overarching policies that set out the key considerations that need to be taken into account when assessing development proposals. The aim of the overarching policies is to deliver a high standard of development on the ground.

5.5.6 **Policy DS1: Development Strategy – Remote Areas** states that: "*The principal policy objective is to support the sustainable development of natural resources and manage change in the landscape to maintain and enhance distinctive character landscapes. There will be a focus on protecting important environmental assets that underpin the sustainable development of natural resources* and tourism."*

**Development of 'natural resources' for the purposes of this policy means the exploitation of naturally occurring resources (e.g. minerals, oil, plants, animals), including energy resources (e.g. wind, sunlight, water).*

5.5.7 With specific reference to landscape, Policy DS1 provides that development proposals should respect, protect and/or enhance the region's rich landscape character, scenic qualities and features and sites designated for their landscape quality at any level. Development proposals are also to reflect the scale and local distinctiveness of the landscape.

5.5.8 The Policy also makes specific reference to sustainable development ensuring development proposals not only protect landscapes but also protect and/or enhance the other important assets of the region.

5.5.9 **Policy PD1: Placemaking and Design** states that: *"Development proposals must demonstrate a satisfactory quality of place-making, siting, scale and design that respect and reflect positive local characteristics and will complement or enhance the surrounding built and natural environment, while taking account of the guidance contained within the Outer Hebrides Design Guide.*

Minerals

5.5.10 **Policy ED5: Minerals** states that: *"Proposals for borrow pits will be supported to allow the extraction of minerals near to or on the site of associated development (e.g. wind farm development or infrastructure projects) provided it can be demonstrated that there are significant benefits compared to obtaining the materials from local quarries and that criteria a) to i) above are met. These consents will be time-limited, tied to the proposal and must be accompanied by full restoration proposals and aftercare.*

"Planning applications for mineral extraction must include detailed proposals for the phased restoration and aftercare of the site, including its intended after-use. Returning the land to a productive and beneficial use should take place at the earliest opportunity. Restoration should be designed and implemented to the highest standard and after-uses should result in environmental improvement. Opportunities to add to the cultural, recreational or environmental assets of the area will be encouraged.

If operators cannot demonstrate that their programme of restoration (including the necessary financing, phasing and after-care of the sites) is sufficient, a financial guarantee may be sought to ensure the restoration of the site is completed to the required standard."

Hydrology, Hydrogeology, Geology, Peat and Waste Management

5.5.11 **Policy EI 1: Flooding** states that: *"Development proposals should avoid areas susceptible to flooding and promote sustainable flood management. Where sustainable flood management measures are proposed they should incorporate environmental improvements, for example natural methods such as* *restoration of floodplains, wetlands and water bodies, which can also contribute to reducing flood risk and help implement the proposals within the Outer Hebrides Local Flood Risk Management Plan.*

Development proposals should have regard to the probability of flooding from all sources. Where a proposal could lead to an increase in the number of persons affected or buildings at risk of being damaged by flooding then the submission of suitable information, which may include a Flood Risk Assessment, will be required to demonstrate compliance with Scottish Planning Policy (SPP)."

5.5.12 Alongside the above stated text, Policy EI 1 can require development proposals to undertake a Flood Risk Assessment alongside other flood risk criteria that the Policy establishes.

5.5.13 **Policy EI 2: Water and Waste Water** states that: *"New developments will be required to adopt the principles of Sustainable Drainage Systems (SuDS). The Comhairle will support retrofitting of SuDS and the controlling of surface water through the use of permeable surfaces and green roofs."*

5.5.14 **Policy EI 3: Water Environment** states that: *"Development proposals should avoid adverse impact on the water environment. All proposals involving activities in or adjacent to any water body must be accompanied by sufficient information to enable a full assessment to be made of the likely effects, including environmental effects, of the development.*

Where a site contains or is adjacent to a watercourse or the sea then all the following must be demonstrated:

a) The site layout avoids development within the water environment unless the location is essential for operational reasons, e.g. for navigation and water-based uses. A minimum buffer strip of 6m should be incorporated between the water body and the proposed development, to enable access and maintenance all year round. Engineering activities such as culverts, bridges, watercourse diversions, bank modifications or dams should be avoided unless there is no practicable alternative;*

b) The management or enhancement of existing and new habitats such as the provision of riparian/green corridors, natural flood management within flood plains, control of invasive non-native species, removal of redundant structures such as weirs or culverts;

c) No significant effect both during construction and after completion on:

- *Water quality in groundwater, adjacent watercourses or areas downstream;*
- *Existing groundwater abstractions within 250m;*
- *Water quantity and natural flow patterns and sediment transport processes in all water bodies.*

For Major developments, where a site contains or is adjacent to a wetland or boggy area then a Phase 1 habitat survey should be carried out for the whole site and a 250m buffer around it. Where a Groundwater Dependent Terrestrial Ecosystem is identified then the site layout should avoid it and drainage designed to ensure groundwater flows to the habitat are maintained.

**May be subject to technical assessment and possible consultation with statutory consultees".*

5.5.15 Policy EI 3 provides detailed guidance on flooding, ensuring development proposals in the region do not compromise its surroundings flood resilience and are not at erroneous risk of flooding.

5.5.16 **Policy EI 4: Waste Management** states that: *"Preparation of a Site Waste Management Plan will be required to accompany proposals for Major developments…"*

5.5.17 **Policy EI 5: Soils** states that: *"Development should be designed to minimise adverse impacts on soils caused by ground disturbance, compaction or excavation. Developers should assess the likely effects associated with any development work on soils, particularly machair soil, peat, or other carbon-rich soils and associated vegetation, and aim to mitigate any adverse impacts arising…"*

5.5.18 Policy EI 5 also requires development proposals for major developments and some large scale renewable energy proposals to demonstrate that they would not result in the unnecessary disturbance of carbon rich soils (such as peat) and any associated vegetation. The Policy can also require development proposals to provide a peat management plan.

Landscape and Natural Heritage

5.5.19 **Policy NBH1: Landscape** states that: *"Development proposals should relate to the specific landscape and visual characteristics of the local area, ensuring that the overall integrity of landscape character is maintained.*

The Western Isles Landscape Character Assessment (WI-LCA) will be taken into account in determining applications and developers should refer to Appendix 1 of this Plan for a summary of this guidance.

Development proposals should not have an unacceptable significant landscape or visual impact. If it is assessed that there will be a significant landscape or visual impact, the applicant will be required to provide mitigation measures demonstrating how a satisfactory landscape and visual fit can be achieved.

National Scenic Areas

Development that affects a National Scenic Area (NSA) will only be permitted where:

a) The objectives of designation and the overall integrity of the area will not be compromised; or

b) Any significant adverse effects on the qualities for which the area has been designated are clearly outweighed by social, environmental or economic benefits of national importance.

5.5.20 The Proposed Development does not lie within a National Scenic Area.

5.5.21 **Policy NBH2: Natural Heritage** states that: *"Development which is likely to have a significant effect on a Natura site and is not directly connected with or necessary to the conservation management of that site will be subject to an Appropriate Assessment by the Comhairle.*

Development which is likely to have a significant effect on a Natura site will only be permitted where:

a) An Appropriate Assessment has demonstrated that it will not adversely affect the integrity of the site; or

b) There are no alternative solutions; and

c) There are imperative reasons of overriding public interest, including those of a social or economic nature; and

d) Compensatory measures are provided to ensure that the overall coherence of the Natura network is protected.

Development that affects a Site of Special Scientific Interest (SSSI) or National Nature Reserve (NNR) will only be permitted where:

a) The objectives of designation and the overall integrity of the area will not be compromised; or

b) Any significant adverse effects on the qualities for which the area has been designated are clearly outweighed by social, environmental or economic benefits of national importance.

All Ramsar wetland sites are also Natura sites and/or Sites of Special Scientific Interest and are included in the statutory requirements noted above…

Where there is good reason to suggest that a European Protected Species (EPS) is present on site, or may be affected by a proposed development, the Comhairle will require any such presence to be established and, if necessary, a mitigation plan provided to avoid or minimise any adverse impacts on the species, prior to determining the application.*

Planning permission will not be granted for development that would be likely to have an adverse effect on an EPS unless the Comhairle is satisfied that:

f) There is no satisfactory alternative; and

g) The development is required for preserving public health or public safety or for other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment; and

h) the development will not be detrimental to the maintenance of the population of an EPS at a favourable conservation status in its natural range.

Planning permission will not be granted for development that would be likely to have an adverse effect on a species protected under the Wildlife and Countryside Act 1981 (as amended in Scotland) unless the development is required for preserving public health or public safety. For development affecting a species of bird protected under the 1981 Act there must also be no other satisfactory solution.

Applicants should submit supporting evidence for any development meeting these tests, demonstrating both the need for the development and that a full range of possible alternative courses of action have been properly examined and none found to acceptably meet the need identified…

*Development proposals should avoid having a significant adverse effect on, and where possible should enhance, biodiversity and ecological interests of the site. Developers are encouraged to assess the impacts of their proposed development on UK Biodiversity Action Plan (BAP) priority species and habitats and Local BAP habitats and species. Developers should refer to the Scottish Biodiversity List** for a full list of animals, plants and habitats considered to be of principal importance for biodiversity conservation in Scotland (this list includes all UK priority species).*

Development proposals that would potentially damage or destroy geological interests, such as those found within Geological Conservation Review sites, are unlikely to be supported. Applications for development potentially affecting geological interests must demonstrate how damage will be avoided or minimised so that the interest of the site is preserved. The Comhairle will also seek to consider how geological interests can be created or enhanced through development.

**Developers should refer to the list of protected species and supporting information on the SNH website http://www.snh.gov.uk/protecting-scotlands-nature/protected-species/.*

***http://www.snh.gov.uk/protecting-scotlands-nature/biodiversity-scotland/scottishbiodiversity-list"*

5.5.22 The Proposed Development Site is located on the boundary of the Lewis Peatlands SPA, Ramsar and SAC. There are a number of protected species on site including several birds, as well as otters. **Appendix 8H: Habitats Regulations Assessment** sets out further information on this.

5.5.23 **Policy NBH3: Trees and Woodland** states that: *"The Comhairle will safeguard individual trees, groups of trees and woodland areas where they are considered important for amenity or their cultural or historic interest by establishing Tree Preservation Orders.*

There is a strong presumption against the removal of established individual trees and woodland of mixed native species which have a landscape and amenity value and/or contribute to nature conservation, unless removal would achieve significant additional economic, environmental or social benefits.

In order to minimise any adverse impacts on amenity, biodiversity or landscape value, developers will be required to incorporate existing trees and woodland into developments through sensitive siting and design. Where loss is unavoidable, appropriate replacement planting should be sought through the use of planning conditions or through a legal agreement if appropriate. The Comhairle will seek opportunities to create new woodland and plant native trees in association with new development."

5.5.24 Policy NBH3 provides protection to the trees and woodlands of the region, ensuring development proposals protect and/or enhance local tree assets and potentially provide more woodlands to the region.

5.5.25 **Policy NBH4: Built Heritage** states that: *"Development which preserves or enhances the architectural, artistic, commemorative or historic significance of built heritage assets will be supported. Where there is clear evidence of historic significance, development which would have a substantial adverse impact on this significance will only be permitted where it can be demonstrated that:*

a) All reasonable measures will be taken to mitigate any loss of this significance; and

b) Any lost significance which cannot be mitigated is outweighed by the social, economic, environmental or safety benefits of the development…"

5.5.26 This Policy requires development proposals to ensure they would only have substantial adverse impact on the built heritage of the region after applying considerable mitigation and provide considerable benefits to the region. The Policy also protects important designated heritage assets such as Listed Buildings, Thatched Buildings and Commemorative Sites etc.

5.5.27 **Policy NBH5: Archaeology** states that: *"Development proposals which preserve, protect, or enhance the archaeological significance of heritage assets, including their settings, will be supported.*

Development Impact on Scheduled Monuments or their Setting

Scheduled Monuments (scheduled archaeological remains) are nationally important monuments or archaeological sites. Where there is potential for a proposal to have a direct impact on a scheduled monument, the written consent of Historic Environment Scotland is required in addition to any other consent required.

There is a presumption in favour of the in situ *preservation of all scheduled archaeological remains and the Comhairle will support proposals that seek to protect, enhance and interpret them. Development proposals that will adversely impact upon scheduled archaeological remains or the integrity of their settings will only be permitted in exceptional circumstances where there is no practical alternative site and where there are imperative reasons of overriding public interest.*

Development proposals that may adversely impact upon the cultural significance of scheduled archaeological remains or the integrity of their settings will require to be supported by:

a) An assessment of the significance of any heritage assets which are affected by the development; and

b) The measures that will be taken to mitigate any adverse effect on the archaeological significance; and

c) The measures that will be taken to preserve and protect the special interest of the heritage asset; and

d) A justification that demonstrates the social; economic; environmental, safety or other imperative reasons of overriding public interest that would outweigh any adverse effect which cannot be mitigated.

Development Impact on other Sites of Archaeological Importance

Where a development proposal is likely to negatively affect any regionally or locally important archaeological remains, applicants may be required to undertake archaeological assessment.

Where, on the advice of the Comhairle Archaeology Service, information or evidence available indicates that significant archaeological remains may exist; a predetermination evaluation may be required in accordance with an approved Written Scheme of Investigation (WSI). The evaluation may include: desk based assessment (DBA); geophysics; field survey; trial trenching; or other methods of gathering information. The findings of such evaluations will help define the character and extent of any remains and their likely significance and inform what further archaeological mitigation may be required.

Where further archaeological investigation is required, or in cases where archaeological remains of lesser significance are considered likely to be present, archaeological investigation of the site and/or mitigation may, on the advice of the Comhairle Archaeology Service, be secured by archaeological planning conditions or through use of a planning agreement.

On receipt of the findings of an archaeological investigation, further investigation and/or mitigation may be required on the advice of the Comhairle Archaeological Service.

Development which would affect unscheduled sites of archaeological interest or potential will be permitted where the significance of the remains does not justify their physical preservation on site.

Where archaeological features provide potential for amenity, cultural tourism, place-making, or as an in situ educational or research resource, the Comhairle will support proposals for long term management, access and interpretation of the historic environment assets on the site…

Callanish Sensitive Area

Within the Callanish Sensitive Area there is a heightened potential for impacting on known sites and their settings as well as the possibility of encountering unknown archaeological sites and features. Further explanation and guidance on assessment of impact from development proposals can be found in the Calanais Standing Stones Setting Document, 2014. If ground disturbance is part of the development, developers may be required to carry out a predetermination evaluation prior to determination of any planning application. These points should be viewed as considerations in proposed development designs and not as an impediment to development.

Archaeologically Sensitive Areas

Within the Stornoway and Howmore Archaeologically Sensitive Areas (as shown in the relevant Conservation Area Management Plans) developers may be required to carry out a predetermination evaluation prior to the determination of the planning application if ground disturbance is part of the development. The results of the evaluation will help determine any mitigation required as part of the consent."

5.5.28 **Policy NBH6: Historic Areas** states that: *"All Development should preserve or enhance the settings of Historic Areas…"*

5.5.29 Policy NBH6 also goes into detail on the need for development proposals to protect World Heritage Sites, Conservation Areas, Gardens and Designated Landscapes and Battlefields.

Other Relevant Policies

5.5.30 **Policy PD2: Car Parking and Roads Layout** governs the design and quality of new car parking places and roads within the region, ensuring they are of a suitable design to their surroundings and, especially with regard to new roads, safe. It is important to note that only the parts of the policy relating to the roads (creation and layout) is relevant to the Proposed Development.

5.5.31 **Policy PD6: Compatibility of Neighbouring Uses** states that: *"All development proposals shall ensure that there is no unacceptable adverse impact on the amenity of neighbouring uses. Where appropriate, proposals should include mitigation measures to reduce the impact on the amenity of neighbouring uses."*

5.5.32 **Policy EI 7: Countryside and Coastal Access** ensures that development proposals do not compromise the Hebridean Way and important Core Paths of the region and allow for the continued use/access to the countryside and coast.

5.5.33 **Policy EI 11: Safeguarding** establishes that CnES will consult the relevant consultees (such as the National Air Traffic Services (NATS), Ministry of Defence (MOD) etc) on development proposals and take into account any advice provided.

5.5.34 **Policy EI 12: Developer Contributions** states that: *"The Comhairle may negotiate with developers a fair and reasonable contribution towards infrastructure and/or services required as a consequence of the proposed development. The contributions will be proportionate to the scale and nature of the development (including cumulative) and will be addressed through planning conditions or through a legal agreement if appropriate."*

5.6 Supplementary Planning Guidance (SPG): Wind Energy Development (November 2018)

5.6.1 The Supplementary Guidance provides further guidance on the delivery of the Outer Hebrides Local Development Plan Policy EI8 Energy and Heat Resources, and to provide further detail through policies & additional advice to assist in planning for the provision of all scales of wind energy development in the Outer Hebrides.

5.6.2 This Supplementary Guidance aims to:

- Provide applicants with a guide to the areas where the principle of onshore 'wind farms' (larger turbine developments) may be acceptable;
- Provide applicants with a guide to the areas where the principle of onshore 'wind farms' (larger turbine developments) will not be acceptable;
- Set out the CnES's definition of a 'wind farm;
- Set out development policies for the assessment of all scales of wind turbine.

5.6.3 It identifies a spatial strategy for wind farms, in line with the requirements of the SPP, outlining areas that have the potential for wind farms, areas of constraint (with some potential in some certain circumstances) and areas unacceptable for wind farms (Map 1: Comhairle Spatial Strategy for Wind Farms[3]). The Development Site lies within an Area of Constraint (with potential in some certain circumstances).

5.7 References

Comhairle nan Eilean Siar, November 2018, Outer Hebrides Local Development Plan, Adopted Plan.

[3] https://www.cne-siar.gov.uk/media/12627/map-1-comhairle-spatial-strategy-for-wind-farms.pdf

Comhairle nan Eilean Siar, November 2018, Outer Hebrides Local Development Plan, Supplementary Guidance: Wind Energy Development.

European Commission, 2018, Clean Energy Package.

Scottish Government, 1989, The Electricity Act 1989.

Scottish Government, 1997, The Town and Country Planning (Scotland) Act 1997.

Scottish Government, 2009, The Climate Change (Scotland) Act 2009.

Scottish Government, 2014, Scottish Planning Policy.

Scottish Government, 2014, Scotland's Third National Planning Framework (NPF3).

Scottish Government, 2014, Onshore Wind Turbines: Planning Advice.

6. Landscape and Visual

Non Technical Summary

The Landscape and Visual Impact Assessment (LVIA) has been undertaken by chartered landscape architects at Wood in accordance with the Guidelines for Landscape and Visual Impact Assessment, 3rd Edition (Landscape Institute and IEMA, May 2013), hereafter referred to as GLVIA 3. The assessment process has encompassed the construction, operational and decommissioning phases of the Proposed Development and has included design iteration and assessment of the residual effects.

Consultation relevant to the landscape, visual and cumulative assessment has been undertaken with Scottish Natural Heritage (SNH) and Comhairle nan Eilean Siar (CnES) who commented on aspects of methodology, sources of information, scope of assessment, viewpoint assessment and developments to be considered as part of the cumulative assessment.

Design Principles and Mitigation

The design of the Proposed Development has developed with reference to a series of principles drawn from the Consented Development, CnES Wind Energy Development Supplementary Guidance, Western Isles Landscape Capacity Study for onshore wind energy development and further advice from SNH and CnES, with the aim of utilising larger and more productive turbines, whilst also mitigating potential landscape, visual and cumulative effects.

The assessment results indicate that the georgraphical extent of potentially significant landscape and visual effects for the Proposed Development is broadly similar to those of the Consented Development.

The potential for the turbines larger than 150m to blade tip would necessitate use of aviation safety or warning lights, which have been assessed as a 'worst-case'.

Significant Landscape, Visual and Cumulative Effects

In order to assess the effects of Development on the landscape, it is important to first understand the characteristics in which schemes are to be located. Landscape Character Types are identified to allow an assessment of the effect a scheme will have on different types of landscape. Likely significant effects (including significant cumulative effects) arising as a result of the Proposed Development would be contained within the host *Boggy Moorland (Boggy moor 1),* and three other areas of surrounding landscape character within approximately 5km of the Proposed Development. There would be no predicted significant effect on the South Lewis, Harris and North Uist National Scenic Area.

A Zone of Theoretical Visibility (ZTV) has been produced to show the theoretical visibility of the Proposed Development; the ZTV indicates that the primary visibility will be within 14km of the Development Site. An assessment has been completed to consider the effects the scheme would have on a number of identified receptors including settlements, transport and recreation routes and the closest individual properties. Significant visual effects (including significant cumulative effects) have been assessed on ten settlements, seven transport routes, three regional and local recreational routes, and three visitor destinations, all contained within approximately 14km of the Proposed Development.

Significant effects have also been identified for a number of residential properties. As a result, a residential visual amenity assessment has been carried out. This has identified that none of the residential properties identified as experiencing significant effects would experience such effects that would result in an overbearing effect from the Proposed Development, sufficient to affect the living standards of the individual property to such an extent that it would become an unattractive place to live (as opposed to less attractive) when judged objectively, and in the public interest.

Due to the height of the wind turbines proposed, aviation regulations require the turbines to be lit. The LVIA assessment has therefore considered the effects of the required lights. Significant night-time landscape effects would be contained within the host landscape character (*Boggy Moorland*) within approximately 5km of the Proposed Development. Significant night-time visual effects would be contained to locations within approximately 10km of the Proposed Development and limited to parts of four settlements, seven transport routes, two regional recreational routes and three visitor destinations. All of these visual effects would be experienced in the context of existing light sources at Stornoway, the Eitseal transmission mast, and four existing wind energy developments within this same area.

6.1 Introduction and Overview

6.1.1 This Chapter assesses the landscape and visual effects of the Proposed Development. It should be read with reference to the Project description in **Chapter 4: Project Description**.

6.1.2 Landscape and Visual Impact Assessment (LVIA) is one of the key components of the EIA for wind farms due to the introduction of tall elements into the environment. The Proposed Development has been considered against the requirements of the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 and any relevant planning policies, relating to the landscape resource and visual amenity.

6.1.3 The LVIA and cumulative LVIA (CLVIA) reported in this chapter have been produced by chartered landscape architects at Wood. The objective of this assessment has been to determine the landscape and visual effects of the Proposed Development on the existing landscape resource and visual amenity. The following landscape and visual receptors have been assessed:

- Landscape character, key characteristics, and elements;
- Designated landscapes; and
- Views and visual amenity experienced by residents, tourists, visitors, and road and ferry users.

6.1.4 The Development Site is located to the west of Stornoway on the Isle of Lewis and is set within an area of *Boggy Moorland* landscape character. The Proposed Development comprises 35 wind turbines, with ten turbines to a maximum height of 156m to blade tip in the east and the remaining 25 turbines with a maximum height of 180m to blade tip.

6.1.5 Infrastructure associated with the Proposed Development includes four site entrances (two main entry points from the A859 and two from the A858), internal access tracks and hardstanding areas, crane pads, up to five borrow pits, one temporary construction compound (including three smaller satellite compounds), and grid connection infrastructure (including up to three substations – one main control building with battery storage facilities and two smaller secondary substations).

6.1.6 The assessment process has encompassed the construction, operation, and decommissioning of the Proposed Development and has included design iteration and further assessment of the residual effects. The aim of the process has sought to achieve an improvement to the efficiency of the wind farm and as a result there has been a higher energy generation capacity for the Development Site. This is balancedagainst the environmental considerations and achieving an acceptable design in terms of landscape and visual effects.

Appendices and Figures

6.1.7 This Chapter is supported by five Appendices. These are set out in **Volume 4** as follows:

- **Appendix 6A**: Methodology and Glossary;
- **Appendix 6B**: Viewpoint Analysis;
- **Appendix 6C**: Residential Visual Amenity Assessment;
- **Appendix 6D**: Night-time Assessment; and
- **Appendix 6E**: Additional Viewpoints.

6.1.8 Figures are provided to accompany and illustrate this Chapter and are contained within **Volume 3**. They include plans and visualisations of the Proposed Development. Further figures illustrating plans and visualisations in support of **Appendices 6C:** Residential Visual Amenity Assessment, **6D**: Night-time Assessment, and **6E:** Additional Viewpoints, are contained in **Volume 4.**

6.2 Methodology and Approach

6.2.1 The assessment methodology is set out in **Appendix 6A**, which includes a glossary of terms and abbreviations used in this Chapter. The methodology for the LVIA and CLVIA has been undertaken in accordance with best practice guidance including, but not limited to, the following:

- *Guidelines for Landscape and Visual Impact Assessment,* 3rd Edition, Landscape Institute and IEMA (May 2013), hereafter referred to as GLVIA 3;
- *Siting and Designing Windfarms in the Landscape*, Version 3a, SNH (August 2017);
- *Guidance: Assessing the Cumulative Impact of Onshore Wind Energy Developments,* SNH (2012); and
- *Visual Representation of Wind Farms Version 2.2*, SNH (February 2017).

Determining the Significance of Effects

6.2.2 In accordance with the EIA Regulations, it is important to determine whether the predicted effects resulting from the Proposed Development are likely to be significant. Significant landscape, visual and cumulative effects are highlighted in **bold** in the text and, in most cases, relate to all those effects that result in a '**Substantial**' or a '**Substantial / Moderate**' effect as indicated in **Table 6.1**. In some circumstances, Moderate levels of effect also have the potential, subject to the assessor's opinion, to be considered as significant and these exceptions are also highlighted in bold and explained as part of the assessment where they occur.

6.2.3 The matrix below uses the same terminology as set out in the LVIA of the Consented Development for consistency and ease of reference.

Table 6.1 Evaluation of Landscape and Visual Effects

		Landscape and Visual Sensitivity			
		High	**Medium**	**Low**	**Negligible**
Magnitude of Change	**High**	**Substantial**	**Substantial / Moderate**	Moderate	Slight
	Medium	**Substantial / Moderate**	Moderate	Slight	Slight / Negligible
	Low	Moderate	Slight	Slight / Negligible	Negligible
	Negligible	Slight	Slight / Negligible	Negligible	Negligible
	Zero	None / No View			

Policy and Legislation

6.2.4 The LVIA process has taken account of national and local planning policy in relation to wind farm development, as well as the Comhairle nan Eilean Siar (CnES) *Local Development Plan*, *Supplementary Guidance: Wind Energy Development,* November 2018 and the *SNH Landscape capacity study for onshore wind energy development in the Western Isles*, 2004. Further information on Planning Policy is provided in **Chapter 5: Legislation and policy overview**.

SNH Western Isles Landscape Character Assessment

6.2.5 Landscape character is defined and described in the *SNH Western Isles Landscape Character Assessment, Review 92 (1998)*. More recently, SNH has published a digital-map based national Landscape Character Assessment (*LCA*) in 2019 which illustrates each Landscape Character Type (LCT) in detail with updated descriptions for each one. These updated LCT descriptions have been used in this assessment. The LCT boundaries are largely similar to those published in 1998, with minor updates relating to their names.

6.2.6 There are 11 different LCTs across the Western Isles, with the description of their key characteristics based on physical, ecological, cultural and aesthetic components. The *LCA* (1998) sought to identify forces for change (not updated in 2019) within each LCT and identifies guidance for the management of identified changes. In some cases these were identified as trends relating to grant schemes which are now outdated.

6.2.7 The Proposed Development is located within the *Boggy Moorland* LCT. The *LCA* (2019) states that:

"This landscape is characterised by large scale, gently undulating peat moorlands, indented with numerous large and small rounded lochs, which are frequently interconnected by narrow, slow moving rivers. Loch edges are highlighted by their deep, dark peat margins and rivers are cut into smaller peat edged valleys. Occasional small shallow sided hills rise from these gently undulating surroundings.

… Relatively few elements contribute to this character type, and these tend to be simple and contrasting. The muted tones of moorland vegetation, gently rolling topography, frequent reflective water bodies, and inland locations of much of the boggy moorlands, combine to give these areas a remote upland character, which is unusual in a lowland area."

SNH at al Landscape Capacity Study for Onshore Wind Energy Development in the Western Isles (2004)

6.2.8 A study to consider the landscape capacity for onshore wind energy development in the Western Isles was commissioned by SNH and published in 2004. This was part of a pilot study that "*involved the development and application of a methodology for assessing the capacity of the landscape to accommodate wind energy based on landscape character*".

6.2.9 The study states that it "*…cannot be used as an indication of the suitability of a particular location for wind energy development. Individual applications will still require detailed landscape and visual impact assessments.*"

6.2.10 The SNH Capacity Study is based on the SNH *LCA* (1998), and in some instances further sub-divides the LCTs into sub-types. It also identifies landscape sensitivity in terms of physical criteria and landscape perception, as well as an overall judgement of landscape sensitivity to wind energy development. In relation to the host *Boggy Moorland* LCT, this is divided into two sub-types:

- *Boggy Moor 1* LCT, where lochans are occasional rather than a main feature (the Proposed Development is located within this LCT); and
- *Boggy Moor 2* LCT, where lochans are numerous creating a strong patterning, and interplay of land and water with reflective effects.

6.2.11 *Boggy Moor 1* LCT is the largest area of *Boggy Moorland* and covers much of the northern half of the Isle of Lewis as illustrated in **Figure 6.14**. The key characteristics are described in terms of '*physical criteria*' (open landscape, large horizontal scale, simple landform, uninhabited, simple landscape pattern and composition) and '*perceptual criteria*' (expansive and vast, uninhabited, simple, flat, and general lack of artefacts) and '*visibility*' (high to very high level of visibility).

6.2.12 The SNH Capacity Study concludes that the scale of the large expanses of *Boggy Moor 1* LCT could physically accommodate an extensive wind farm development and that fewer large turbines would be preferable to more small ones. It further notes that their simplicity and extent would relate well to large simple forms. It also notes that regard should be paid to avoid locating development near the various landmark hills that rise from Boggy Moor particularly in Lewis and Benbecula. It also notes that places where Boggy Moor acts as a foil to accentuate the more complex scenery of Mountain Massif should also be avoided. The SNH Capacity Study defines the sensitivity of *Boggy Moor 1* LCT as:

- Physical Criteria – Low to Medium sensitivity; and
- Perceptual Criteria – Medium sensitivity.

6.2.13 It is to be noted that the SNH Capacity Study is slightly outdated considering advanced technology of turbines greater than 120m to tip height, and the change in baseline cumulative situation since the publication of the Study. However, the principles of the capacity study remain and are considered to apply to this assessment.

Consultation

6.2.14 Consultation relevant to the landscape, visual and cumulative assessment was undertaken with SNH and CnES who commented on aspects of methodology, sources of information, scope of assessment, viewpoint assessment and developments to form part of the cumulative assessment.

6.2.15 The scoping report and Scoping Opinion are provided in **Appendices 2A** and **2B**. A summary of these consultation responses is provided in **Table 6.2**.

6.2.16 A Design 'Chill' workshop was held at CnES's offices on 6 November 2018. With regards to the LVIA, CnES agreed the locations of the new viewpoints (24 – 28) to be included in the assessment, and the exclusion of three viewpoints (A, B and C) from the assessment (these are however, presented as visualisations in **Appendix 6E**). The following points are to be noted:

- The location of Viewpoint 1 (A858 / Hebridean Way) has been moved onto the actual road which is now representative of road users on the route and is approximately 700m from the suggested grid coordinates provided by CnES. Viewpoint C has therefore been excluded on the basis that views from both locations would be very similar;
- Viewpoint 28 (**Figure 6.50a-e**) represents the views of the Proposed Development from Iolaire Memorial;
- Viewpoints A (Co-op) and B (Ferry Terminal) have been excluded from the assessment, as agreed with CnES (though visualisations have been provided in **Appendix 6E**); and
- Viewpoint D has now been renumbered to Viewpoint C (Gress to Tolsta Road) and is presented as a visualisation in **Appendix 6E**.

6.2.17 Further consultation was undertaken with SNH regarding the presentation of six viewpoints (VP 2, 3, 4, 5, 24 and 27) in relation to their '*Visual Representation of Wind Farms, Version 2.2*' (2017), guidance. The approach was agreed on 4 February 2019.

6.2.18 Further consultation was also undertaken with CnES regarding the approach to the Residential Visual Amenity Assessment (RVAA) which was agreed on 5 February 2019.

Table 6.2 Summary of Consultee Comments

Consultee Comments	Response to Consultee Comments
Summary of Consultation from SNH	
SNH considers the proposed list of viewpoints of the LVIA to be "*suitably representative and comprehensive*".	Noted
SNH agree with the recommendation to scope out a Wild Land Assessment.	Noted
SNH highlight the following key sensitivities for the Proposed Development to be considered through the LVIA, including design of the wind farm. • *The position of the windfarm in relation to both the town of Stornoway and the interior peatlands. It will be important that the windfarm does not seem to impinge upon and/ or surround the settlement when seen from key viewpoints within and approaching the town, including from the ferry route. It will also be important that the windfarm does not seem to diminish the characteristic sense of wide open space across the interior peatlands; for example, by being associated with Stornoway yet being seen from the north coast, thereby seeming to reduce the sense of wide open expanse that currently seems to separate these areas;* • *The varying local landscape character over the windfarm site. This may mean that the character of the windfarm could also vary over the site and thus create a confusing image with sub-groups;*	Each of the six sensitivities listed by SNH have been considered in detail in the LVIA through a number of design iterations set out in **Chapter 3**. The design evolution and principles from the Consented Development has been reviewed against the current SNH and landscape capacity guidance and certain modifications have been made in setting the design objectives for the Proposed Development. **Chapter 3** sets out the design evolution of the Proposed Development whilst **Section 6.5** in this chapter summaries the landscape design evolution.

Consultee Comments	Response to Consultee Comments
• *The irregular nature of the landform. This may limit the number and position of wind turbines in order to create a simple windfarm image, avoiding variable elevation, spacing, outliers and overlapping of wind turbines within views;* • *The location of roads through the windfarm site along which the receptor sensitivity will be high and the scale of the wind turbines would be emphasised at close proximity to high numbers of receptors. Impacts would be limited significantly if the windfarm development could be restricted to one side of key routes;* • *The impact of existing and consented windfarms within the area. The proposal will need to relate to these in character and location to avoid conflicts of design, including wind turbine size;* • *The relationship between wind turbine height and the scale of existing features within the landscape. It will be important that the wind turbines do not seem to dominate the prominence of existing vertical features and landmarks such as the Barvas hills, and structures within and surrounding Stornoway, including the Lews Castle.*	
Summary of Consultation from CnES	
CnES ask for clarification that the finalised ZTVs reflect the turbine parameters accurately.	The ZTVs presented in **Figures 6.2-6.5** reflect the correct turbine parameters (156m and 180m to tip height)
Wild Land CnES defer to SNH for their position on the consideration of a Wild Land Assessment, and consideration of extending the wider study area from 35 to 45km and the detailed study area to beyond 15km.	SNH have confirmed in its scoping opinion (22 August 2018) that a Wild Land Assessment is not required (**Appendix 2B**). SNH make no comment to extending the Study Area which is therefore deemed to be appropriate as set out in the scoping report - the wider 35km and detailed 15km Study Areas are considered in this assessment.
CnES recommend that areas of low landscape capacity (LDO SG: Map 2 SPP Spatial Framework & Other Considerations) should be included in the landscape assessment.	LCTs within the 15km Study Area that overlap with the areas of low landscape capacity on Map 2 are included in the landscape assessment.
CnES advises that the Callanish Sensitive Area, local historic area designation to be included in the assessment.	As this is a heritage designation, the assessment of effects on the Callanish Sensitive Area is considered in **Chapter 7: Cultural Heritage**.
Visual Receptors ***Viewpoint Selection*** CnES suggest removing VP19: Pairc Mullach Breac Mhalasgair from the viewpoint list due to the lack of interest to visual receptors.	This viewpoint has been excluded from the assessment.
CnES recommend detailed ZTVs illustrating the visibility from the town of Stornoway.	Detailed ZTVs maps illustrating the visibility from Stornoway are provided in **Figures 6.20a-c.**
CnES have requested additional viewpoint locations at:	Following further discussions with CnES, viewpoints have been included in the assessment at: • Upper Newvalley (VP24); • Newmarket (VP25);

Consultee Comments	Response to Consultee Comments
• Upper Newvalley; • Newmarket; • Oliver's Brae; • Stornoway Co-op car park; • Stornoway Ferry Terminal; • Pentland Road Hebridean Way; • On Approach to A859 from B897; • Gress to Tolsta Road; • Iolaire Memorial; • Achmore Stone Circle.	• Oliver's Brae (VP26); • On Approach to A859 from B897 (VP27); • Iolaire Memorial (VP28). Additional visualisations, as agreed with CnES, are also provided for the following in **Appendix 6E**: • Stornoway Co-op car park (VP A); • Stornoway Ferry Terminal (VP B); • Gress to Tolsta Road (VP C). With regards to Pentland Road / Hebridean Way, Viewpoints 1 and 13 are representative of views from these. However, a viewpoint between viewpoints 1 and 13 is included as part of the sequential assessment for Pentland Road / Hebridean Way (**Figure 6.23c-d**). With regards to Achmore Stone Circle, this is included as a heritage viewpoint within **Chapter 7 (Figure 7.5)**.
Cumulative Assessments CnES suggests additional locations to the cumulative sequential assessments from a number of locations.	The sequential assessment includes all cumulative wind farms within 35km. Additional Angle of View (AoV) illustrations have been provided, as requested, for Newmarket (VP25), Lewis War Memorial (VP2), and Barvas Moor (VP7) and included in the viewpoint assessment in **Appendix 6B**.
CnES suggest assessing the impacts on nearby communities with regards to light pollution.	The night time assessment considers the night time effects on views from the nearby villages of Maryhill / Newvalley / Newmarket / Bennadrove in **Chapter 6** and **Appendix 6D**.
Cumulative Impact CnES ask whether the proposed Sandwick East Community or Sandwick North Street applications within the Development Site should be considered in the cumulative assessment.	The location of the proposed Sandwick East turbines are located on areas where the Consented Development turbines would be located. Therefore it is not physically possible to construct the Consented Development and these Sandwick turbines. The Proposed Development is a re-design of the Consented Development and is independent of the proposed Sandwick applications; taking a pragmatic approach, these schemes are scoped out of the cumulative assessment as it would not be possible to construct both.
Core Paths CnES expects the EIA to demonstrate that the Proposed Development complies with the Wind Energy SG with respect to minimum distance from public roads or paths identified in the Outer Hebrides Core Paths Plan.	The distance of the nearest proposed turbine to the nearby roads / paths is as follows: • A858 / Hebridean Way / Timeless Way - 142m; • Pentland Road is 843m; • A859 - 970m; • Core Path 6 – 2,218m. Compliance with the Wind Energy SPG in terms of distance to the A858 / Hebridean Way / Timeless Way is addressed further in the **Planning Statement.**

Consultee Comments	Response to Consultee Comments
Local Recreational Routes CnES expect the Hebridean Way and Sustrans Cycle route 780 to be considered in the LVIA and in accordance with the Wind Energy SPG.	The assessment considers the effects on the Hebridean Way and Sustrans Cycle Route 780 in **Section 6.8**.
Residential Visual Amenity CnES request for a RVAA to be undertaken for all properties within 2km of the Proposed Development.	A detailed RVAA has been undertaken in **Appendix 6C** for all properties within 2km of the Proposed Development. The approach of the assessment was agreed with CnES on 5 February 2019.

Viewpoint Selection

6.2.19 Viewpoint selection was based on locations identified for the Consented Development. As far as possible, viewpoints have been selected to represent the Proposed Development at its most visible, as experienced by a range of receptor groups, from varying directions, and over varying distances.

6.2.20 In total, 27 viewpoints were identified which have been agreed through consultation with CnES and SNH and include five new locations as requested by CnES.

6.2.21 For consistency and ease of reference, the viewpoint numbers in this assessment remain the same as for the assessment of the Consented Development, with new locations added after Viewpoint 23. Viewpoint 19 has been excluded from this assessment at the request of CnES. These viewpoints are set out in **Table 6.3**.

6.2.22 A further three viewpoints, as agreed with CnES, are provided in **Appendix 6E**. These viewpoints were previously scoped out due to the limited visibility of the Proposed Development.

6.2.23 Viewpoint analysis has also been used for the night-time assessment which included five of the day-time viewpoint locations. The Night-time Assessment is reported in **Appendix 6D**.

Table 6.3 Viewpoint Location Selection Process

Viewpoint Selection	Distance (Nearest Proposed Turbine)	Comments
Viewpoints included within the Viewpoint Analysis		
1. A858 / Hebridean Way	1,214m	Representative of views from the main transport route and Hebridean Way long distance walking route to the southwest of the Development Site.
2. Stornoway (Lewis) War Memorial	3,035m	Elevated point within the settlement of Stornoway with wide panoramic views.
3. A859 North of Luirbost (Leurbost)*	2,856m	View from the main transport route, north of the small settlement of Luirbost, and south of the Development Site.

Viewpoint Selection	Distance (Nearest Proposed Turbine)	Comments
4. Cnoc na Croich (Gallows Hill)	3,401m	Elevated view within Lews Castle and Lady Lever Park Garden and Designed Landscape.
5. Beinn Mholach	3,324m	Local hill summit (remote view) to the northwest of the Development Site and accessed by walkers.
6. Èitseal (Eitshal)	4,072m	Local hill summit with masts to the southwest of the Development Site, primarily accessed by workers, and occasional walkers.
7. A857 Between Stornoway and Barabhas (Barvas)*	4,462m	Representative of views from the main transport route to the north of the Development Site.
8. Stornoway - Ullapool Ferry Route A	5,170m	Requested by SNH for the Consented Development (wireline only).
9. Tunga (Tong)*	5,721m	View from the settlement of Tunga, northeast of the Development Site.
10. Raon na Crèadha, Stornoway	5,859m	View from the edge of the settlement of Greater Stornoway, east of the Development Site.
11. Ranais (Ranish)*	6,954m	View from the settlement of Ranais, south of the Development Site. Requested by SNH for the Consented Development.
12. Col (Coll)	8,838m	View from the settlement of Col, northeast of the Development Site, and on the route of the B895.
13. Rathad a' Phentland (Pentland Road)	10,165m	Representative of views from minor road, west of the Development Site. Requested by SNH for the Consented Development.
14. An Rubha - An Cnoc (Eye Peninsula - Knock)*	10,866m	View from the settlement of An Rubha – An Cnoc, east of the Development Site.
15. Gearraidh Bhaird (Garyvard)	10,780m	View from the settlement of Gearraidh Bhaird, south of the Development Site.
16. Stornoway – Ullapool Ferry Route B	13,329m	Requested by SNH for the Consented Development (wireline only)
17. Standing Stones of Calanais (Callanish)	13,282m	View from visitor attraction, west of the Development Site. Requested by Historic Environment Scotland for the Consented Development.
18. An Rubha - Sulaisiader (Eye Peninsula - Shulishader)	14,164m	View from the settlement of An Rubha - Sulaisiader, east of the Development Site.
20. B8011 East of Giosla	16,607m	Representative of long-distance views from a minor road, west of the Development Site. Requested by SNH for the Consented Development.
21. A857 near Barabhas (Barvas)	16,080m	Representative of long-distance views from an A-road, north of the Development Site, and close to the settlement of Barabhas. Requested by SNH for the Consented Development.
22. Tolastadh bho Thuath (North Tolsta)	17,579m	Long-distance, elevated view from the settlement of North Tolsta, northeast of the Development Site.

Viewpoint Selection	Distance (Nearest Proposed Turbine)	Comments
23. An Cliseam (Clisham)	30,771m	Long distance, panoramic views from the summit of Clisham within the National Scenic Area and Wild Land Area, southwest of the Development Site.
24. Upper Newvalley	2,527m	Requested as 'new' viewpoint location by CnES. Representative of views from the settlement of Upper Newvalley, Greater Stornoway.
25. Newmarket	2,926m	Requested as 'new' viewpoint location by CnES. Representative of views from the settlement of Newmarket, Greater Stornoway.
26. Oliver's Brae	5,405m	Requested as 'new' viewpoint location by CnES. Representative of views for road users and residents at Oliver's Brae, Greater Stornoway.
27. B897 Approach at A857	3,018m	Requested as 'new' viewpoint location by CnES. Representative of views for road users on the B897.
28. Iolaire Monument	6,484m	Requested as 'new' viewpoint location by CnES. Representative of views for visitors and residents to the Monument.
Viewpoints excluded from the assessment		
19. Pairc: Mullach Breac Mhalasgair (Park: Malasgair)	14,925m	Excluded from the assessment as requested by CnES
Additional Viewpoints excluded from the assessment (though included as visualisations in Appendix 6E)		
A. Co-op car park	4,180m	Requested by CnES.
B. Stornoway Ferry Terminal	4,242m	Requested by CnES.
C. Gress to Tolsta Road	13,560m	Requested by CnES.

*Note: Viewpoint also used as a night-time assessment viewpoint, see **Appendix 6D**.

Cumulative Wind Energy Development

6.2.24 Drawing from SNH guidance[1], a cumulative baseline of all existing and consented wind energy development within the 35km Study Area, is included in the assessment, and agreed with CnES through scoping (See **Appendix 2B**). In accordance with the SNH guidance, projects at or up to the scoping stage have not been included.

6.2.25 There are no wind farms at application stage within the 35km Study Area. However, it is noted that there are variations proposed for the consented Druim Lethann and Muaitheabhal wind farms which are at the pre-planning and scoping stages. Considering their distance of over 17km from the Proposed Development, and limited information available in the public domain, these variations are not included as there would be no material change to the cumulative assessment over and above the consented wind farms.

6.2.26 An application for a single turbine up to 145m to blade tip (Sandwick North St Community Wind Turbine) was submitted to CnES in February 2017. The location of this turbine is within the red line

[1] Scottish Natural Heritage, March 2012, Guidance: Assessing the Cumulative Impacts of Onshore Wind Energy Developments.

boundary of the Proposed Development (and shares the same location as T27 of the Consented Development). Considering that the Proposed Development is a re-design of the Consented Development and taking a pragmatic approach, as agreed with CnES, this proposed single turbine is scoped out of the cumulative assessment.

6.2.27 In total, 13 other wind energy developments are included in the assessment as listed in **Table 6.4** and illustrated in **Figure 6.8**. The identification number in the table relates to that used in the figures.

6.2.28 The most relevant wind energy developments to the CLVIA include those sites within 10km and in particular the existing sites of Beinn Ghrideag, Pentland Road, Arnish Moor, Creed and Bridge Cottages.

Table 6.4 Wind Energy Development Included in the CLVIA

Name and reference	No. of turbines	Distance (km)[2]	Hub height (m)	Rotor diameter (m)	Tip height (m)
Existing Wind Energy Developments within 35km					
E01. Beinn Ghrideag	3	0.4	80	90	125
E02. Pentland Road	6	0.7	80	82.4	121.2
E03. Arnish Moor	3	1.9	50	52	76
E04. Creed	1	2.0	44.44	33.4	61.14
E05. Bridge Cottages Newmarket	1	3.1	30.9	18	39.9
E06. Horshader	1	16.1	55	52	81
E07. Baile an Truseil	3	16.8	55	52	81
E08. North Tolsta	1	17.0	55	52	81
E09. Monan Community	3	33.2	60	52	86
Consented Wind Energy Developments within 35km					
C01. Muaitheabhal (Beinn Mhor)	33	16.6	90	110	145
C02. Druim Leathann	14	16.6	80	93	126.5
C03. Muaitheabhal (East Extension)	6	17.0	90	120	150
C04. Muaitheabhal (South Extension)	6	20.1	70 / 90	120	150 / 130

ZTV and Cumulative ZTV Analysis

6.2.29 The Zone of Theoretical Visibility (ZTV) analysis is used to assist the design and further define the scope of the assessment process. The ZTVs have been calculated using ReSoft WindFarm computer software to produce an area of potential visibility of any part of the proposed turbines, calculated

[2] Measured from the nearest turbine of each wind energy development.

to turbine blade-tip and hub-height, or selected infrastructure. The ZTVs do not however take account of built development and vegetation, which can significantly reduce the area and extent of actual visibility in the field and, as such, these provide the limits of the visual assessment Study Area. As a result, there may be roads, tracks and footpaths in the wider setting which, although shown as falling within the ZTV, have restricted viewing opportunities since they are heavily screened or filtered by banks, walls and vegetation for example. The ZTVs therefore provide a starting point in the assessment process and accordingly tend towards giving a 'worst-case' or over-estimated scenario of the potential visibility of the turbines.

6.2.30 The ZTV maps indicate the areas from where it may be theoretically possible to view all or some of the proposed turbines. Comparative ZTVs have also been used to show the difference in theoretical visibility between the Consented Development, (calculated to the maximum proposed turbine height of up to 145m to blade tip) and the Proposed Development (calculated to the maximum proposed turbine height of up to 180m / 156m to blade tip).

ZTV Analysis: Proposed Development

6.2.31 The ZTV pattern for the Proposed Development reflects the underlying landform within the 35km Study Area and the percentages of theoretical visibility cover (including the sea) are summarised as follows:

- Total ZTV (to blade tip) coverage accounts for 60.41% of the Study Area. This compares with the Consented Development coverage of 55.19%; and
- Total ZTV (to hub height) coverage accounts for 48.29% of the Study Area. This compares with the Consented Development coverage of 44.04%.

6.2.32 The land-based percentages of theoretical visibility cover (excluding the sea) are summarised as follows:

- Total ZTV (to blade tip) coverage accounts for 39.63% of the Study Area. This compares with the Consented Development coverage of 34.98%; and
- Total ZTV (to hub height) coverage accounts for 30.07% of the Study Area. This compares with the Consented Development coverage of 27.62%.

6.2.33 Theoretical visibility of the Proposed Development is highest within 4km of the Development Site where theoretical visibility is generally indicated in all directions. At 4km, theoretical visibility begins to become patchy, particularly to the north and northwest where Beinn Mholach and adjoining low lying hill screen views; to the west and southwest where Eitseal and surrounding hills screen views, and to the east where the landform falls at the coastline at Cala Steornabhaigh (as illustrated in **Figures 6.2 – 6.5** and **6.7**).

6.2.34 Beyond 4km, but within 10km, theoretical visibility continues to the northeast, becoming patchy due to undulations in the landform. To the south and southeast, undulations in the *Rocky Moorland* and *Cnoc and Lochan* LCT's further reduce the theoretical visibility.

6.2.35 Between 10 and 15km, the greatest theoretical visibility is indicated to the northeast and east over the expansive *Boggy Moorland* LCT and to the east on the Eye Peninsula (An Rubha). Fragmented theoretical visibility continues to the south, southwest and west due to the undulating landform.

6.2.36 Beyond 15km, the theoretical visibility becomes very fragmented to the northeast and southwest, with theoretical visibility mainly indicated on the elevated slopes of low-lying hills to the northeast and on scattered slopes of the *Prominent Hills and Mountains* LCT to the southwest.

ZTV Analysis: Proposed Development compared to the Consented Development

6.2.37 **Figures 6.6a-b** illustrate a comparative ZTV of the Proposed Development and the Consented Development. It may be noted that there would be very limited additional land based theoretical visibility; the main areas are indicated to the west, northwest and north in areas of the *Boggy Moorland* LCT. Additional theoretical visibility is indicated in these areas by blades and blade tips (**Figure 6.6a**) as being more visible than hubs (**Figure 6.6b**).

Cumulative ZTV Analysis

6.2.38 The Cumulative ZTVs (**Figures 6.9a** to **6.13b**) have been produced, illustrating the cumulative visibility of the Proposed Development and other selected wind energy development occurring within the 35km Study area (**Table 6.4**) and grouped in relation to planning status or geographical location.

Cumulative ZTV Analysis: Stornoway and Existing Wind Farms within 10km

6.2.39 The cumulative ZTV pattern for the existing wind farms within 10km and the Proposed Development are illustrated in **Figures 6.9a-b**. This comprises five wind farm developments: including three groups of turbines (Beinn Ghrideag, Pentland Road and Arnish Moor) and two single turbines (Creed and Bridge Cottages). All five developments are located within 3.5km of the Proposed Development, with Beinn Ghrideag within the Development Site and Pentland Road just beyond the Development Site to the north.

6.2.40 Existing wind farm development and the Proposed Development would be cumulatively visible across extensive areas of the *Boggy Moorland* LCT. However, areas of 'new' theoretical visibility would be limited to small areas within 15km, mainly in scattered rural areas of *Boggy Moorland*, and in very limited areas beyond 15km. In most cases the ZTV indicates that views of the Proposed Development would occur in areas where there are already views of existing wind farms, and the Proposed Development would not therefore appear as uncharacteristic.

Cumulative ZTV Analysis: Stornoway with Beinn Ghrideag and Pentland Road

6.2.41 The cumulative ZTV of the Proposed Development with Beinn Ghrideag and Pentland Road is illustrated in **Figures 6.10a-b.** The cumulative ZTV indicates a similar picture to that emerging from the cumulative ZTV pattern of the existing wind farms noted above. Areas of 'new' theoretical visibility would be limited to small areas within 15km, mainly in scattered rural areas of *Boggy Moorland* and in very limited areas beyond 15km. Within 5km (**Figure 6.10b**), additional theoretical visibility is indicated in small areas of the settlement of Stornoway. However, in reality, some of these views would be screened by surrounding buildings in the town and mature trees at Lews Castle and Lady Lever Garden and Designed Landscape (GDL). The Proposed Development would mainly be visible from areas where there is already visibility of other existing schemes and it would not appear uncharacteristic.

Cumulative ZTV Analysis: Stornoway with Arnish Moor, Creed and Bridge Cottages

6.2.42 The cumulative ZTV of the Proposed Development with Arnish Moor, Creed and Bridge Cottages is illustrated in **Figures 6.11a-b**. The ZTV indicates that these developments would be seen separately in the landscape with the Proposed Development; Arnish Moor and Creed are more visible together with the Proposed Development to the south and west whilst Bridge Cottages is more visible with the Proposed Development to the north and east. The area where all of the developments would be theoretically visible together is indicated mainly within 15km to the northeast, east and south. Additional theoretical visibility from the Proposed Development is indicated mostly from within areas of *Boggy Moorland* to the north and west.

Cumulative ZTV Analysis: Existing and Consented Wind Farms between 10km and 35km

6.2.43 Further cumulative ZTV plots are illustrated in **Figures 6.12a-b** and **6.13a-b** which indicate the cumulative pattern of theoretical visibility for other existing and consented wind farms between 10-35km from the Proposed Development. The cumulative pattern of these ZTVs indicates that the visibility of these wind farms would be focused on areas to the north and northwest of the within 35km, mainly within the *Boggy Moorland* and some *Crofting* LCTs. The exception to this is the consented Muaitheabhal wind farms which would be mostly visible to the south. **Figures 6.13a-b** indicate that the Muaitheabhal wind farms would be visually remote from the Proposed Development and significant cumulative visual effects would be unlikely.

Viewpoint and Cumulative Viewpoint Analysis

6.2.44 The viewpoint analysis is used to assist the design and further define the scope of the assessment. In particular, the outer distance from the Proposed Development, where significant effects are most likely, has been identified. This has been used to focus the baseline information and detailed reporting of this assessment.

6.2.45 The viewpoint analysis has been conducted from 27 viewpoint locations as illustrated in **Figures 6.2-6.3**. Five of these viewpoints were identified for the night-time assessment and the views from these locations are illustrated in **Figures 6D.5-6D.9** and assessed in a separate appendix (**Appendix 6D**).

6.2.46 Cumulative wind farm development that would be visible within the 35km Study Area has been illustrated as wirelines.

Geographical Extent of Potentially Significant Visual Effects

6.2.47 The outer distance from the Proposed Development, where significant effects may be likely has been identified by the viewpoint analysis of the Proposed Development. Further, cumulative viewpoint analysis has identified a potential threshold for significant cumulative visual effects that would result from the Proposed Development, in addition to, or in combination with other existing and consented wind energy developments.

Potential Threshold for Significant Effects: Proposed Development

6.2.48 The viewpoint analysis indicates that the significant visual effects could extend out to locations approximately 14km from the nearest turbine locations, as indicated by Viewpoints 1-6, 8-12, 14, 15, 18 and 24-28.

6.2.49 The threshold of approximately 14km from the Proposed Development can be subdivided into two areas. The first is an area of up to approximately 6km from the Proposed Development where viewpoints 1, 2, 3, 4, 5, 6, 8, 9, 24, 25 and 26 indicate significant visual effects (High and High-Medium magnitude of change), experienced by receptors of High to Medium sensitivity. The second area is between 6-14km from the Proposed Development where viewpoints 10, 11, 12, 14, 15, 18, 27 and 28 indicate significant visual effects (Medium to Medium-Low magnitude of change), experienced by receptors of High sensitivity, mainly areas of settlement and one minor road of Medium sensitivity.

6.2.50 The night-time assessment (**Appendix 6D**) indicates that the potential for significant visual effects to occur as a result of aviation warning lights would be within approximately 10km from the proposed turbine locations.

Potential Threshold for Significant Cumulative Effects

6.2.51 The Proposed Development has also been considered in terms of the combined or cumulative visual effects with other existing and consented wind energy developments. The analysis indicates that further significant cumulative visual effects occur across the Study Area in respect of other wind farm development, particularly where a viewpoint is within close proximity to another development (viewpoints 21 and 22). However, it is important to note that the Proposed Development, where visible, ceases to make a significant contribution to cumulative visual effects beyond approximately 14km from the nearest turbines as indicated by Viewpoint 18. Beyond this distance, either other wind farms become more visible, or the cumulative visual effects of other wind farm developments including Proposed Development are not significant. Significant cumulative visual effects where the Proposed Development contributes to the views include the same viewpoints described in paragraph 6.2.48. However, other wind farms including Pentland Road, Beinn Ghrideag and Creed also add to significant cumulative visual effects at some of these locations.

6.2.52 This initial indication has been tested further as part of the assessment, with this focused on the central portion of the Study Area out to approximately 15km radius from the outermost turbines. Importantly, these levels of effect are indicative of a visual effect on a particular viewpoint location and they should not be assumed to translate into effects on the overall visual experience, as each of the viewpoints have been specifically located where the sensitivity of the receptor and the views of the Proposed Development would be greatest. In this sense they are not typical or representative. The baseline inventory and assessment process has also considered those remaining receptors within the wider 35km Study Area that are of national importance (see **Section 6.4**)

Interpretation of Viewpoint Analysis Summary Tables

6.2.53 The information set out in **Table 6.5** provides a summary of the viewpoint analysis of the effects of the Proposed Development on a 'solus' or primary basis. This part of the assessment helps to define the contribution the Proposed Development would make to any subsequent cumulative assessments (in addition to, or in combination with, other wind farms). It is also relevant to the latter half of the operational period for the Proposed Development, when the consented periods of operation for other wind farms would expire and they would be decommissioned, assuming no extensions to the operating periods or re-powering schemes are granted.

6.2.54 The information set out in **Table 6.5** provides a summary of the cumulative viewpoint analysis for the Proposed Development. The cumulative analysis sets out the effects of the Proposed Development 'in addition' to and 'in combination' with other existing and consented wind energy developments, assessing one additional scenario in accordance with the methodology in **Appendix 6A** as follows:

- Scenario 1: Existing + Consented + the Proposed Development:
  - The additional and combined cumulative effects on the baseline, including the existing and consented wind energy developments with the Proposed Development are reported.

6.2.55 The summary table (Table 6B.1 in **Appendix 6B**) list the names of the viewpoints and include the following information:

- Viewpoint Analysis (undertaken in accordance with the methodology in **Appendix 6A)**:
  - Distance: The distance of the viewpoint location from the nearest turbine within the Proposed Development, as set out in **Table 6.5**;
  - Sensitivity: The sensitivity of the viewer at the viewpoint location is recorded (ranging from High, Medium, Low, and Negligible);

- Magnitude: The magnitude of change, taking account of the Proposed Development only is recorded (ranging from High, Medium, Low, Negligible, and zero);
- Level of Effect: The level of visual effect for the Proposed Development only is recorded and takes account of the sensitivity and magnitude.

- Cumulative Viewpoint Analysis:
  - Magnitude (Existing and Consented wind farms): The magnitude of change, taking account of other existing and consented / under construction wind farms that may be visible is recorded (ranging from High, Medium, Low, Negligible, and zero);
  - Additional Level of Effect: The additional effect of adding the Proposed Development to the existing and consented baseline in Cumulative Scenario 1 is provided; and
  - Cumulative Scenario 1: The level of visual effect, taking account of the other existing, consented / under construction wind farms and the Proposed Development, is recorded (taking account of the sensitivity and magnitude).

6.2.56 Those levels of effect shown in bold relate to significant effects in accordance with the relevant EIA Regulations and the developments contributing most to the cumulative effects are recorded in brackets.

6.3 Sunlight and Weather Conditions

6.3.1 Changing weather patterns and local climatic conditions would influence the visibility of the Proposed Development which would vary from periods of low visibility (fog, low cloud, and bright sunny conditions that are accompanied by haze generated by temperature inversions) as well as periods of high visibility in clear weather. In some instances, the Proposed Development may appear 'back-lit' (e.g. appearing darker in colour during sunset/sunrise and periods of pale or white blanket cloud) and in other circumstances may appear to be 'up-lit' (e.g. during stormy periods that combine dark clouds and bright sunshine).

6.3.2 In respect of the night-time assessment, clear or mostly clear skies with few clouds have been assumed, although it is recognised that cloudy skies will appear darker and seasonal change will affect the time periods for dusk and dawn.

6.3.3 All of the viewpoint analyses and assessment have assumed conditions of good weather and clear visibility.

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Table 6.5 Summary of Viewpoint Analysis

Viewpoint No. and Title	Distance to nearest turbine (m)	Viewpoint Analysis: Proposed Development (up to 180m / 156m to blade tip)			Cumulative Viewpoint Analysis: Proposed Development (PD) and other wind farms		
		Sensitivity	Magnitude	Level of Effect:	Magnitude (Existing and Consented)	Additional Level of Effect	Combined Level of Effect
1. Viewpoint 1: A858 / Hebridean Way	1,214	High to Medium	High	**Substantial to Substantial / Moderate**	Medium	**Substantial to Substantial / Moderate**	**Substantial to Substantial / Moderate** (PD, Pentland Road and Beinn Ghrideag)
2. Viewpoint 2: Lewis War Memorial	3,035	High	High	**Substantial**	Medium	**Substantial**	**Substantial** (PD, Pentland Road and Beinn Ghrideag)
3. Viewpoint 3: A859, north of Luirbost	2,856	Medium	High-Medium	**Substantial / Moderate to Moderate**	Medium to Low	**Substantial / Moderate to Moderate**	**Substantial / Moderate to Moderate** (PD, Pentland Road and Beinn Ghrideag)
4. Viewpoint 4: Cnoc na Croich (Gallows Hill)	3,401	High	High	**Substantial**	Medium	**Substantial**	**Substantial** (PD, Pentland Road, Beinn Ghrideag and Creed)
5. Viewpoint 5: Beinn Mholach	3,324	High	High	**Substantial**	High	**Substantial**	**Substantial** (PD and Pentland Road)
6. Viewpoint 6: Eitseal	4,072	Medium	High-Medium	**Substantial / Moderate to Moderate**	Low	**Substantial / Moderate to Moderate**	**Substantial / Moderate to Moderate** (PD, Pentland Road and Beinn Ghrideag)
7. Viewpoint 7: A857 between Stornoway and Barvas	4,462	Medium	Medium	Moderate	Medium to Low	Moderate	Moderate
8. Viewpoint 8: Stornoway – Ullapool Ferry Route A	5,170	High-Medium	High-Medium	**Substantial / Moderate**	Low	**Substantial / Moderate**	**Substantial / Moderate**
9. Viewpoint 9: Tunga (Tong)	5,721	High	High-Medium	**Substantial to Substantial / Moderate**	Low	**Substantial to Substantial / Moderate**	**Substantial to Substantial / Moderate**

wood.

Viewpoint No. and Title	Distance to nearest turbine (m)	Viewpoint Analysis: Proposed Development (up to 180m / 156m to blade tip)			Cumulative Viewpoint Analysis: Proposed Development (PD) and other wind farms		
		Sensitivity	**Magnitude**	**Level of Effect:**	**Magnitude** (Existing and Consented)	**Additional Level of Effect**	**Combined Level of Effect**
10. Viewpoint 10: Raon na Credha, Stornoway	5,859	High	Medium	**Substantial / Moderate**	Low	**Substantial / Moderate**	**Substantial / Moderate**
11. Viewpoint 11: Ranais (Ranish)	6,954	High	Medium	**Substantial / Moderate**	Low	**Substantial / Moderate**	**Substantial / Moderate**
12. Viewpoint 12: Col (Coll)	8,838	High	Medium-Low	**Substantial / Moderate to Moderate**	Low	**Substantial / Moderate to Moderate**	**Substantial / Moderate to Moderate**
13. Viewpoint 13: Pentland Road	10,165	Medium	Low	Moderate / Slight	Low to Negligible	Moderate / Slight	Moderate / Slight
14. Viewpoint 14: An Rubha - An Cnoc (Eye Peninsula - Knock)	10,866	High	Medium	**Substantial / Moderate**	Low	**Substantial / Moderate**	**Substantial / Moderate**
15. Viewpoint 15: Gearraidh Bhaird (Garyvard)	10,780	High	Medium-Low	**Substantial / Moderate** to Moderate	Low	**Substantial / Moderate** to Moderate	**Substantial / Moderate** to Moderate
16. Viewpoint 16: Stornoway – Ullapool Ferry Route B	13,329	High-Medium	Medium-Low	Moderate	Low to Negligible	Moderate	Moderate
17. Viewpoint 17: Standing Stones of Calanais	13,282	High	Negligible	Slight	Low to Negligible	Slight	Moderate to Slight (Pentland Road)
18. Viewpoint 18: An Rubha - Sulaisiader (Eye Peninsula - Shulishader)	14,164	High	Medium-Low	**Substantial / Moderate** to Moderate	Low	**Substantial / Moderate** to Moderate	**Substantial / Moderate** to Moderate
20. Viewpoint 20: B8011 East of Giosla	16,607	High to Medium	Low	Moderate to Moderate / Slight	Low	Moderate to Moderate / Slight	Moderate to Moderate / Slight
21. Viewpoint 21: A857 near Barabhas (Barvas)	16,080	High to Medium	Low	Moderate to Moderate / Slight	High	Moderate to Moderate / Slight	**Substantial to Substantial / Moderate** (Baille an Trusseil)

Viewpoint No. and Title	Distance to nearest turbine (m)	Viewpoint Analysis: Proposed Development (up to 180m / 156m to blade tip)			Cumulative Viewpoint Analysis: Proposed Development (PD) and other wind farms		
		Sensitivity	Magnitude	Level of Effect:	Magnitude (Existing and Consented)	Additional Level of Effect	Combined Level of Effect
22. Viewpoint 22: Tolastadh bho Thuath (North Tolsta)	17,579	High	Low-Negligible	Moderate / Slight	High	Moderate / Slight	**Substantial** (Druim Leathann and North Tolsta)
23. Viewpoint 23: Clisham	30,771	High	Negligible	Slight	Low	Slight	Moderate (Muaitheabhal)
24. Viewpoint 24: Upper Newvalley	2,527	High	High-Medium	**Substantial to Substantial / Moderate**	Low	**Substantial to Substantial / Moderate**	**Substantial to Substantial / Moderate**
25. Viewpoint 25: Newmarket	2,926	High	High	**Substantial**	Low	**Substantial**	**Substantial**
26. Viewpoint 26: Oliver's Brae	5,405	High to Medium	High-Medium	**Substantial to Substantial / Moderate** (residents) **Substantial / Moderate to Moderate** (road users)	Medium to Low	**Substantial to Substantial / Moderate** (residents) **Substantial / Moderate to Moderate** (road users)	**Substantial to Substantial / Moderate** (residents) **Substantial / Moderate to Moderate** (road users)
27. Viewpoint 27: B897 Approach to A859	3,018	Medium	Medium	**Moderate**	High	**Moderate**	**Substantial/ Moderate** (PD and Arnish Moor)
28. Viewpoint 28: Iolaire Mounment	6,484	High	Medium	**Substantial / Moderate**	Low	**Substantial/ Moderate**	**Substantial/ Moderate**

Note: Significant effects are indicated in bold text.

6.4 Baseline

6.4.1 Information on the existing landscape resource or baseline conditions included in this assessment has been collected from local plans, OS maps and relevant literature, as well as information gathered from field surveys. This baseline information is set out as an inventory of the existing landscape resource and focuses on those landscape and visual receptors with most potential to be significantly affected.

6.4.2 The baseline inventory is set out as follows:

- Baseline Landscape Receptors:
  - Landscape Character of the Development Site;
  - Landscape Elements and Features;
  - Landscape Character of the Surrounding Area; and
  - Landscape Designations.
- Baseline Visual Receptors:
  - Settlements and Residential Properties;
  - Transport Routes;
  - Recreational Routes;
  - Recreational and Tourist Destinations; and
  - Anglers.
- Information Gaps.

Baseline Landscape Receptors

6.4.3 The landscape receptors in this assessment include the landscape character types and landscape planning designations identified at a national, regional and local planning level.

6.4.4 The blade tip ZTV and day-time viewpoint analysis indicates that significant visual effects and cumulative visual effects would be limited to within approximately~14km, with the recommendation that the assessment should focus on the central area, 15km from the Proposed Development. The significance threshold for night-time visual effects (**Appendix 6D**) would be restricted to approximately 10km from the Proposed Development.

6.4.5 As agreed through consultation, landscape character and local landscape planning designations have been assessed within 15km of the Proposed Development. Only those receptors of national importance are included within the wider 15-35km Study Area.

6.4.6 The landscape character of the 35km Study Area is classified within the *Landscape Capacity Study for Onshore Wind Energy Development in the Western Isles, SNH Commissioned Report No. 42* (2004) and the *SNH Landscape Character Assessment* (2019) which is based on the *Western Isles Landscape Character Assessment, SNH Review No. 92* (1998).

6.4.7 Drawing from these assessments, the landscape character of the 35km Study Area is illustrated in **Figure 6.14**. In addition, **Figures 6.15a-b** illustrate the landscape character at an enlarged, more detailed scale.

Landscape Character of the Development Site: Boggy Moorland (Boggy Moor 1 LCT)

6.4.8 The 'host' landscape for the Proposed Development is an extensive area of *Boggy Moorland* LCT, and the turbines and site infrastructure would be located within *Boggy Moor 1* LCT, as defined in the 2004 capacity study. *Boggy Moor 1* LCT covers the majority of the northern part of the Isle of Lewis and is closely related to adjoining areas of *Rocky Moorland* LCT.

6.4.9 The key characteristics of the host LCT as described in the SNH *LCA* (2019) are as follows:

- Large scale, gently undulating peat moorlands;
- Relatively few landscape elements;
- Numerous large and small rounded lochs, interconnected by narrow, slow-moving rivers;
- Occasional small, shallow-sided hills;
- Sea cliffs with eroded gullies at the coast;
- Remote upland character;
- Predominantly uninhabited;
- Visible cultural elements dominated by shielings and township boundary dykes; and
- Expansive horizontal scale and remoteness.

6.4.10 The main forces for change in this landscape type are related to woodland expansion, upgrading of roads and infrastructure routes and changes in agricultural land management. The impacts of these changes tend mainly to influence the expansive horizontal scale and remoteness qualities which are key characteristic of the *Boggy Moorland* LCT.

Landscape Elements and Features

6.4.11 Landscape elements and features contributing to landscape character at a localised scale in and around the Proposed Development are illustrated in **Figure 6.15b**.

6.4.12 The Development Site covers an area of approximately 1,700ha (of which the Proposed Development occupies 38.13Ha). Topography within the Development Site ranges between approximately 60m AOD in the low-lying southeastern portion to 153m AOD in the northwestern portion at Beinn Thulabaigh.

6.4.13 Ground cover within the Development Site is relatively in keeping with the key characteristics of the *Boggy Moorland* LCT in so far as it predominantly comprises open areas of boggy moorland, intersected by watercourses and several lochs (which are particularly concentrated in the south). However, in addition to these characteristic elements, there are also several pockets of plantation forestry within the Development Site to the west, east and north.

6.4.14 The Development Site is bisected by the A858 / Hebridean Way / Timeless Way, which extends east-west from Marybank in the east to Pentland Road in the west. The existing Beinn Ghrideag Wind Farm is located to the west within the Development Site. Other anthropogenic influences include Bennadrove Landfill Site (to the north of the A858, west of Marybank), the wind turbines at Pentland Road, Arnish Moor, Creed and Bridge Cottages to the north, east and southeast, a number of industrial sites in the vicinity, and areas of historic and current peat cutting. Other tall features in the landscape include a transmission mast associated with Pentland Road Wind Farm to the northwest, two telecommunications masts on Eitseal to the southwest and two transmission masts to the northeast near Loch Airigh na Lic. Pylons and telegraph poles are present within and beyond the Development Site.

Landscape Character of the Surrounding Area

6.4.15 Beyond the host landscape character, the Proposed Development would not have a direct effect on landscape character. Rather, the landscape effects would be indirect and relate to views and visual or perceptual characteristics which are noted to be a key feature of the surrounding landscape character.

6.4.16 Further landscape character within 15km (**Figure 6.15a**), and overlapped by the blade tip ZTV for the Proposed Development, is described in the SNH *LCA* (2019), and included in the assessment as follows:

- *Gently Sloping Crofting (Crofting 1);*
- *Boggy Moorland (Boggy Moor 2);*
- *Rocky Moorland – Outer Hebrides; and*
- *Cnoc and Lochan.*

6.4.17 Of the nine LCTs within 15km on the Development Site (excluding Inland Loch and Coastal Island), five are overlapped by the blade tip ZTV for the Proposed Development and are included in the assessment. The remaining four LCTs (*Machair 2, Linear Crofting, Dispersed Crofting and Mountain Massif*) are excluded from the assessment due to there being 'No View' or very limited visibility of the Proposed Development and intervening distance.

Landscape Character within 15km – 35km

6.4.18 Within the wider 15-35km (at approximately 27.5km to the southwest), there is one area of landscape character (*Dramatic Mountain Massif* LCT) designated at a national level as a result of being within the South Lewis, Harris and North Uist National Scenic Area (NSA). As the ZTV illustrates very limited visibility of the Proposed Development from this LCT, and the long-distance of over 27.5km, it is excluded from detailed assessment on the basis that changes would be of Negligible magnitude and effects not significant.

Landscape Designations

6.4.19 The Development Site is not designated for landscape reasons at either a local level or nationally. Therefore, there would be no direct landscape effects on designated landscapes. Rather, any potential effects would be limited to indirect landscape effects, such as those upon the views experienced in relation to areas with landscape designations.

6.4.20 Landscape Designations within the 35km Study Area are illustrated in **Figure 6.16**.

National Landscape Designations

6.4.21 The following national landscape designations within 35km of the Proposed Development and the blade tip ZTV, are included in the assessment:

- South Lewis, Harris and North Uist NSA.

6.4.22 GDLs are assessed under visual receptors as a tourist destination.

Local Landscape Designations

6.4.23 There are no local landscape designations within 15km of the Proposed Development.

Wild Land Areas

6.4.24 The assessment of effects on Wild Land Areas has been scoped out of the LVIA as agreed through scoping (See **Appendix 2B**).

Baseline Visual Receptors

6.4.25 The visual assessment includes those receptors that are overlapped by the blade tip ZTV illustrated in **Figures 6.4-6.5**.

6.4.26 The objective of the visual assessment is to assess the potential visual effects on views and visual amenity, which are likely to be experienced by receptors (people) within the landscape, as follows:

- Views from residential properties and settlements;
- Views experienced whilst travelling through the landscape (road users, walkers, horse riders and cyclists for example) and seascape (ferry users, anglers for example); and
- Views from tourist and recreational destinations.

6.4.27 The ZTV highlights all those areas and receptor locations within the 35km Study Area where the Proposed Development would be theoretically visible (noting that it excludes vegetation and built form and as such, overestimates visibility). Nonetheless, the ZTV forms the starting point for the assessment and the establishment of the baseline visual receptor locations which are to be included in the assessment.

6.4.28 The ZTV and day-time viewpoint analysis indicates that the assessment should be focused on a detailed Study Area of 15km from the Proposed Development. The significance threshold for night-time visual effects (**Appendix 6D**) would be restricted to approximately 10km of the Proposed Development. Taking a precautionary approach, and drawing from consultation advice and best practice guidance, the visual assessment has been focused on all local receptors (settlements, roads and local recreational routes) within 15km. Other receptors have been assessed within the wider 15-35km Study Area and include receptors of regional or national importance such as Sustrans Cycle Routes, long distance footpaths and well-known tourist / recreational destinations that are overlapped by the blade tip ZTV.

Visual Receptors: Settlements and Residential Properties

6.4.29 The assessment of visual effects likely to be experienced from settlements includes consideration of residential areas, the public realm, and public open spaces within the settlement boundaries that would be frequented by people.

6.4.30 Settlements within 15km which are overlapped by the blade tip ZTV (**Figure 6.19**), and are therefore included in the assessment, are as follows:

- Stornoway Core Settlement;
- Greater Stornoway Main Settlement - North (including Newmarket, Newvalley, Markbank and Maryhill);
- Liurbost (Leurbost), Crosbost and Ranais;
- Tong (Tunga) (including Aird Tong (Aird Thunga));
- Grimshader (Griomsidar) (including Ceann Hurnavay);
- Greater Stornoway Main Settlement – East (including Steinis, Sanndabhaig, Park End), Tolm and Mealabost;

- Coll (Col) (including Col Uarach, Cnoc an t-Solais, Back and Griais);
- Cromore (Cromor);
- Knock (An Cnoc), including Suardail and Aiginis (on the Eye Peninsula / An Rubha);
- Gearraidh Bhaird (Garyvard), Kershader and Tabost;
- Garrabost / Upper Garrabost (on the Eye Peninsula / An Rubha);
- Marvig (Marbhig);
- Lower Bayble (Pabail Iarach) and Upper Bayble (Pabail Uarach) (on the Eye Peninsula / An Rubha);
- Barvas (Barabhas);
- Shulishader (Sulaisaidar) (on the Eye Peninsula / An Rubha); and
- Brue (Bru), Arnol and Bragar (including Labost).

6.4.31 Other settlements within 15km of the Proposed Development, listed below, are either located outwith the blade tip ZTV or have very limited visibility of the Proposed Development. They are excluded from the assessment on the basis that effects would be Negligible and not significant:

- Acha Mor (Achamore);
- Glib Cheois (Keose Glebe);
- Lacasaigh (Laxay);
- Garynahine;
- Baile Ailein;
- Calanais (Callanish);
- Breascleit (Breasclete);
- Linsiadar; and
- Calbost.

Residential Visual Amenity Assessment

6.4.32 A RVAA has been undertaken to assess the effects on residential visual amenity likely to arise as a result of the Proposed Development. Residential properties within approximately 2km of the Proposed Development that are overlapped by the blade tip ZTV and shown on the Ordnance Survey 1:25,000 scale map have been considered in the assessment. The approach of the RVAA was agreed with CnES on 5 February 2019.

6.4.33 The RVAA is reported in **Appendix 6C** and is illustrated in **Figures 6C.1-14**.

Visual Receptors: Transport Routes

6.4.34 The visual assessment has considered the potential visual effects likely to be experienced by people travelling through the landscape within 15km of the Proposed Development. Transport routes within the 15km Study Area that are overlapped by the ZTV include:

Visual Receptors: Main Transport Routes

- A858;
- A859;
- A857;
- A866; and
- Stornoway – Ullapool Ferry Route.

Visual Receptors: Minor Transport Routes

- B897;
- B895;
- B8060; and
- Pentland Road.

6.4.35 Other transport routes within 15km of the Proposed Development including the B8011, B8059, C35 minor road between the A858 and A859, and Liurbost Road are either located outwith the blade tip ZTV or have very limited visibility of the Proposed Development due to landform, vegetation and / or built-form. They are excluded from the assessment on the basis that effects would be of Negligible magnitude and not significant.

Visual Receptors: Recreational Routes

6.4.36 The visual assessment has considered the potential visual effects likely to be experienced by people (walkers / cyclists / horse riders / and others) on recreational routes within the Study Area as illustrated in **Figures 6.17-18**.

6.4.37 Local recreational routes have been assessed within 15km of the Proposed Development and include the Core Path Network (rights of way and core paths), which has been sourced from the CnES adopted Core Path Plan.

6.4.38 National and long-distance recreational routes within the wider 35km Study Area have also been considered for assessment and include Scotland's Great Trails and the National Cycle Route network.

Local Recreational Routes within 15km

6.4.39 Local recreational routes (Core Paths) within 15km of the Proposed Development that are overlapped by the ZTV are included within the assessment as follows:

- Core Path 6: Lewis Castle Grounds Paths;
- Core Path 3: Na Gearrannan to Bragar Coastal Path: and
- Core Path 4: Newmarket Gateway All Abilities Path.

6.4.40 Core Path 4 is a very short section of route (400m) to the north of Greater Stornoway Main Settlement. The detailed ZTV (**Figure 6.20b**) illustrates no visibility of the Proposed Development from this short route. The majority of Core Path 3 is located beyond 15km from the Proposed Development and is largely located outwith the ZTV. Both routes are therefore excluded from the assessment on the basis that changes would be of Negligible magnitude and effects not significant.

National / Long Distance Recreational Routes within 35km

6.4.41 The following national level / long distance recreational routes are included in the assessment, where they are overlapped by the blade tip ZTV as follows:

- Sustrans Cycle Route (NCR) 780;
- Hebridean Way; and
- Timeless Way.

Visual Receptors: Recreational and Tourist Destinations

6.4.42 Recreational and tourist destinations included in this assessment include those features that appear as prominent landmarks or landscape features and locations associated with passive recreation such as walking and where there is a clear relationship between the feature / location and the landscape. GDLs listed on the Historic Scotland Gardens & Designed Landscapes Inventory would be included where these are open to the public as well as Scottish National Trust land and Historic Environment Scotland visitor sites.

6.4.43 The assessment excludes other recreational / tourist destinations where the focus of activity is indoors, for example museums, libraries, and gift shops. The assessment has also excluded locations for sports such as quad biking and team sports and hunting / stalking activities where the primary focus would be activity rather than the appreciation of the landscape.

Recreational and Tourist Destinations within 15km

6.4.44 Recreational and tourist destinations within 15km of the Proposed Development that are overlapped by the blade tip ZTV and included in the assessment are listed as follows:

- Stornoway Golf Club / Lewis Castle and Lady Lever Park GDL;
- Lewis War Memorial;
- Standing Stones of Calanais (Callanish);
- Tiupman Head (Rubha an T-siumpain); and
- Iolaire Memorial.

Recreational and Tourist Destinations within 15-35km

6.4.45 Within the wider 15-35km, recreational and tourist destinations at a national or regional level of importance that are overlapped by the ZTV and have been included in the assessment as follows:

- An Cliseam (Clisham), the highest summit within the South Lewis, Harris and North Uist NSA.

6.4.46 The remaining recreational and tourist destinations at a national or regional level of importance including Dun Carloway, The Blackhouse at Arnol, Steinacleit, and The Butt of Lewis are located outside the ZTV and therefore excluded from the assessment.

Visual Receptors: Anglers

6.4.47 Most recreational activity would be expected to be addressed through consideration of effects on receptors on recreational routes or tourist destinations. However, angling has a focus on watercourses rather than defined tourism routes, and given the socio-economic importance of angling, this has been added as an additional receptor group in the assessment.

6.4.48 There are a number of waterbodies / watercourses prevalent within the Study Area. Rather than assess the effects on every single watercourse, the assessment focusses on specific geographic groups which will incorporate several potential centres of angling activity.

Predicted Future Baseline

6.4.49 The lifespan of the Proposed Development would cover a period of approximately 28 years (construction 2.5 years), operation 25 years and decommissioning 0.5 years) and the assessment takes account of this dimension by considering the duration of the likely landscape, visual and cumulative effects. The approximate time periods associated with the Proposed Development, and whether they are long-term or short-term as follows:

- Construction: up to 30 months (short-term);
- Operation: up to 25 years (long-term and reversible); and
- Decommissioning: up to 6 months (short-term).

6.4.50 During this period, the predicted future baseline of landscape and visual receptors (in the absence of the Proposed Development) is unlikely to change beyond that described in the current baseline.

6.4.51 Land management, and consequently landscape character, is dependent on the continuation of favourable development management and economic conditions, which is not a matter for this assessment. However, changes to this baseline could alter the landscape character as follows:

- An increase, decrease or maintenance of current levels of wind farm development. **Table 6.6** sets out the operational periods for existing and consented wind farm development that can be reasonably predicted during the operational period of the Proposed Development; and
- An increase, decrease or maintenance of current levels of forestry. Some of the wind farm developments require localised tree felling or alteration of the existing forestry design plans.

6.4.52 The effects of climate change are similarly difficult to predict at a local level in respect of future change to landscape character. It is however likely that mitigation for climate change in the form of renewable energy would continue to have an influence on this area.

6.4.53 Taking account of reasonably foreseeable changes to the future baseline of other wind energy development set out in **Table 6.6**, and assuming no further planning application to extend or repower these, the default scenario would be a gradual decline in their presence as a result of the existing time limited consents.

Table 6.6 Operational Timescales of Existing and Consented Wind Energy Development within 10km

Name and reference	Year of Commissioning / construction completed	0-5 Yrs	6-10 Yrs	11-15 Yrs	16-20 Yrs	21-25 Yrs
Existing Wind Energy Developments within 10km						
Proposed Development		Proposed operation period of 25 years				
E01. Beinn Ghrideag	2015	Operating for 25 years				
E02. Pentland Road	2013	Operating for 25 years				
E03. Arnish Moor	2007	Operating for 25 years				

Name and reference	Year of Commissioning / construction completed	0-5 Yrs	6-10 Yrs	11-15 Yrs	16-20 Yrs	21-25 Yrs
E04. Creed	2013	Operating for 25 years				
E05. Bridge Cottages Newmarket	2013	Operating for 25 years				
Consented Wind Energy Developments within 10km						
None within 10km						

6.4.54 For the first half of the operational period of the Proposed Development (10-15 years) the existing baseline of other existing wind energy development within 10km, would remain unchanged.

6.4.55 Assuming no further time extensions to the operating periods of existing wind energy development, or future applications and consents for repowering, there would be a gradual and sustained reduction in cumulative wind energy development, combined with an increase in decommissioning activity, within 10km of the Proposed Development during the latter half of the proposed operational period as follows:

- Proposed Operation Period: Years 16-25
  - Years 16-20: Arnish Moor would cease operation. This would be followed by decommissioning over an estimated 1-2year period in line with its existing consent;
  - Years 21-25: Beinn Ghrideag, Pentland Road, Creed and Bridge Cottages Newmarket would cease operation. This would be followed by decommissioning over an estimated 1-2year period in line with their existing consents; and
  - Year 25: The Proposed Development would also cease operation and undergo decommissioning in line with its existing consent.

6.4.56 The baseline program of cumulative wind energy development set out in **Table 6.6** has been included in this assessment.

Information Gaps

6.4.57 The assessment of residential properties or groups of residential properties is limited to those within approximately 2km of the Proposed Development which appear on the Ordnance Survey 1:25,000 scale map. Gaps in this assessment may include any un-mapped properties constructed since the OS mapping was published.

6.4.58 A number of these properties are accessed via private farm tracks / roads and, due to the limitations of access, they have been assessed from the nearest public road or footpath with the aid of wireframes and aerial photographs. In these cases, the assessment should therefore be regarded as an informed estimate of the likely visual effects. Whilst the assessment takes account of the likely views from the ground floors of properties and main garden areas, it excludes upper floors and other non-residential land that may be connected with the property. This is because the RVAA is focused on the main or principal living rooms, likely to be lounges, patios, dining areas / kitchens, conservatories and main garden areas as opposed to bedrooms and bathrooms, which are usually primarily occupied at night.

6.4.59 Assessment work should be proportionate and there are practical limitations in visiting these rooms or otherwise assessing (from ground level) whether elevated views from a particular window on an upper floor or in the roof of a property would have a view; and whether or not this would be significant.

6.4.60 Up to five borrow pit locations have been identified and assessed based on the information available. A further detailed assessment would be undertaken once more information, including a detailed design (post ground truthing) and a restoration plan, is available to confirm the assessment and adjust the borrow pit design and restoration accordingly if required.

6.4.61 Notwithstanding the information gaps set out above, the assessment is considered robust for the purposes of the EIA assessment.

6.5 Design Statement

Introduction

6.5.1 The landscape design and evolution of the Proposed Development has been presented here as a 'Design Statement' which should be read in conjunction with **Chapter 3: Design Evolution and Alternatives**, which sets out the design evolution from a wider environmental and technical perspective.

6.5.2 The production of a Design Statement is encouraged by the Scottish Government (PAN 68) and SNH through its document '*Siting and Design of Wind Farm in the Landscape, Version 3a*' 2017. SNH explains that Design Statements help to communicate the decision-making processes behind the wind farm design and explain why a particular design has been chosen and how this would relate to other wind farm development in the area, which may have influenced the design process.

6.5.3 The inherent nature of wind turbines as tall, modern structures means that the form of the wind farm as a whole is important. Clear design objectives are necessary and the appearance of the wind farm as an object in the landscape has been a key factor in generating the layout. In this respect the design evolution has taken account of the following:

- SNH Guidance on Siting and Designing Windfarms, Version 3a (2017);
- SNH Guidance on Spatial Planning for Onshore Wind Turbines – natural heritage considerations (2015);
- Comments from SNH regarding design advice in their scoping opinion (22 August 2018);
- Comments from CnES in their scoping opinion and at the Design Chill meeting (6 November 2018);
- Location Siting in relation to the SNH Capacity Study (albeit the study was produced in 2004 and does not take account larger turbine typologies and the most up to date cumulative baseline); and
- Design evolution of the Consented Development.

Design Principles and Evolution

6.5.4 The design evolution for the Proposed Development is illustrated in **Figure 3.2**. The process commenced with the Consented Development, but with the aim of utilising larger and more efficient turbines that reflected the latest technological advances for turbine manufacture and design. Further information on the Design principles and evolution of the Proposed Development is set out in **Section 3.4**.

Design Consideration in relation to comments from SNH

6.5.5 The sensitivities listed by SNH in its scoping opinion have been reviewed and considered in the design evolution and assessment process of the Proposed Development as set out in **Table 6.7.**

Table 6.7 Consideration of SNH sensitivities

SNH 'Sensitivity'	Design Consideration of the Proposed Development
The position of the windfarm in relation to both the town of Stornoway and the interior peatlands. It will be important that the windfarm does not seem to impinge upon and/ or surround the settlement when seen from key viewpoints within and approaching the town, including from the ferry route. It will also be important that the windfarm does not seem to diminish the characteristic sense of wide open space across the interior peatlands; for example, by being associated with Stornoway yet being seen from the north coast, thereby seeming to reduce the sense of wide open expanse that currently seems to separate these areas.	A key consideration during the design process has been to create a buffer between the Proposed Development and both the Core Settlement and Greater Settlement of Stornoway. This is in line with guidance in '*Siting and Designing Wind Farms in the Landscape, Version 3a*' (SNH, 2017) which states that '*There may be some locations where larger wind turbines can be accommodated near to or within urban and industrial locations. … In these settings, large wind turbines can appear most appropriate where they are separated slightly from buildings; are seen set back against an area of visual simplicity; or are marginal to the urban/industrial area.*' (Para 3.45). Shorter turbines (up to 156m) on the eastern edge of the Proposed Development have also been a key design principle of identifying an appropriate 'fit' with the landscape and to minimise visual effects. Although the design was also influenced by other environmental and technical constraints (see **Figure 3.1** for constraints), views from key viewpoints have been considered to optimise the fit of the turbines in the landscape and in views from within the settlement. Views from within the Core Settlement illustrate that there would be limited visibility of the Proposed Development which was achieved by increasing the distance of the turbines from the settlement (in comparison to the Consented Development) with a reduction in height. The Proposed Development's relation to Stornoway in views looking towards the settlement has also been considered through viewpoint analysis in views from ferries (Viewpoints 8 and 16) and in views across the open moorland from the north (Viewpoints 7 and 21) and from the west (Viewpoint 13).
The varying local landscape character over the windfarm site. This may mean that the character of the windfarm could also vary over the site and thus create a confusing image with sub-groups.	Landscape character has been considered in relation to the SNH LCA (2019) and the SNH Capacity Study (2004) which further subdivides a number of LCTs including the host *Boggy Moorland – Boggy Moor 1 and 2.* During the design process, consideration was given to various local landscape features within the Development Site including lochs, watercourses (maintaining a minimum stand off of 50m) and areas of deep peat (avoiding areas of deepest peat (i.e. more than 3m)) to avoid creating a '*confusing image with subgroups*'. A range of close-range viewpoints (Viewpoints 1, 3, 4 and 5) were considered to unify the wind farm design in terms of landscape character.
The irregular nature of the landform. This may limit the number and position of wind turbines in order to create a simple windfarm image, avoiding variable elevation, spacing, outliers and overlapping of wind turbines within views.	Various constraints were used during the design of the Proposed Development and final positioning of the turbines. These included the use of multiple turbine heights in achieving a more balanced composition of turbines from key viewpoints (2, 4, 7, 8, 17, 24, 25 and 26) which complement the horizontal and vertical scale of the landscape. The design of the Proposed Development has aimed to minimise variable elevation, spacing, outliers and overlapping from key viewpoints.
The location of roads through the windfarm site along which the receptor sensitivity will be high and the scale of the wind turbines would be emphasised at close proximity to high numbers of receptors. Impacts would be limited significantly if the windfarm development could be restricted to one side of key routes.	The positioning of proposed turbines in relation to roads (particularly the A858, A59 and Pentland Road) was a key consideration during the design process. Offset buffers were used to set turbines back from roads. During the design process, True View Visuals 3D software was used to gain an understanding of the turbine positioning and to gain an impression of the scale of the turbines in views from these routes. Locating turbines south of the A859 was avoided, this being a key principle of the design evolution of the Consented Development. It was acknowledged that existing wind farm development was an existing feature on both sides of the A858 and that localised landform provides degrees of partial screening along the route as it passes through the Proposed Development (Pentland Road / A858 sequential viewpoint 4 – **Figure 6.22c-d** in **Chapter 6**).

SNH 'Sensitivity'	Design Consideration of the Proposed Development
The impact of existing and consented windfarms within the area. The proposal will need to relate to these in character and location to avoid conflicts of design, including wind turbine size.	The existing turbines (Beinn Ghrideag and Pentland Road) were taken into account in developing the overall composition of the Proposed Development. Separation distances and their place within the overall composition were key elements of the design. Consideration of height difference was also used to identify the turbine layout which resulted in the use of two different wind turbine heights. The Proposed Development is located in the same LCT (Boggy Moor 1) as the existing Beinn Ghrideag and Pentland Road wind farms and is a large-scale, open moorland landscape capable of accommodating large wind farm development. In line with guidance for the siting of wind farms near settlement, the Proposed Development was designed to incorporate existing wind farm development in order to prevent '*...multiple wind farms dominating the landscape surroundings of a settlement'* [in this case, Stornoway]. (paragraph 4.15, Siting and Designing Wind Farms in the Landscape, Version 3a, 2017).
The relationship between wind turbine height and the scale of existing features within the landscape. It will be important that the wind turbines do not seem to dominate the prominence of existing vertical features and landmarks such as the Barvas hills, and structures within and surrounding Stornoway, including the Lews Castle.	The effect on existing features (as illustrated in **Figure 6.15b** in **Chapter 6**) in the landscape were a key part of the design process. Viewpoints were identified to assess the potential effects of the Proposed Development on landmark features and structures including Lewis War Memorial, Gallows Hill (near Lews Castle) and Standing Stones of Calanais (Callanish). More distant views of these landscape features were also used in views from the Eye Peninsula and the ferry where the Barvas hills were also visible. The landscape scale of the Development Site, its landscape character and that of the surrounding landscape context from which the Proposed Development would be viewed has influenced the choice of turbine ratio or turbine proportion.

Site Infrastructure Design

6.5.6 Site infrastructure includes 35 wind turbines, on-site access tracks and hard standing areas, a main and two secondary substations (including battery storage facilities), a temporary construction compound (and storage / laydown areas) and up to five borrow pits.

6.5.7 The approximate time periods associated with the Proposed Development and accounted for in the assessment include 25 years of operation with additional periods of up to 30 months for construction and 6 months for decommissioning.

6.5.8 Landscape related aspects of the design are described in this section and mitigation and enhancement measures are recorded in **Table 6.8**. The layout of the Proposed Development and its various infrastructure components are shown in **Figure 4.1**.

Wind Turbines and Transformers

6.5.9 The Proposed Development comprises 35 wind turbines, ten turbines within the eastern part of the Development Site with a maximum height of 156m to blade tip, and the remaining 25 turbines with a maximum height of 180m to blade tip.

6.5.10 The proposed wind turbines would be 3 bladed variable speed, pitch regulated wind turbines with the rotor and nacelle mounted on a cylindrical tower as described in **Chapter 4**.

6.5.11 The viewpoint analysis indicates that the turbines would frequently be viewed against the sky. For these reasons it is proposed that the standard turbine colour of pale grey would be most appropriate. The turbines would be uniform in colour (no company logos or advertising, with a semi-matt finish to reduce their contrast with the background sky and landscape and minimise reflectivity. The turbines would all rotate in the same direction and at a slow and predictable speed of approximately 6 to 18 revolutions per minute according to wind speed. This measure would ensure a reasonable degree of parity between the proposed turbines and other existing, nearby turbines.

6.5.12 Once the wind turbines are erected, the area of hardstanding required for cranes would be re-turfed and / or covered in previously excavated earth and left to revegetate. A 10m x 10m area within the hardstanding would be retained for turning of operational vehicles.

6.5.13 Depending on the turbine specifications chosen, the transformers may be housed internally but, for the purposes of providing a worst-case scenario, the assessment has assumed that the turbine transformers would be housed in an external kiosk (3m x 2m x 3m) adjacent to the turbine tower bases, which would be a darker shade and colour in comparison to the turbines to reduce contrast with the background moorland landscape.

Turbine Lighting

6.5.14 The requirements for turbine lighting are dictated by the CAA and MOD to ensure aviation safety in accordance with Article 222 of the Air Navigation Order 2016. In addition, the proposed turbines would be located within the CAA / NATS and MOD safeguarded area for Stornoway Airport.

6.5.15 It is a requirement of the CAA that all turbines of 150m or greater in height to blade tip should be lit at the highest point on the nacelle or hub, and on three sides of the tower at half the hub height. An assessment of the night-time effects of turbine lighting is provided in **Appendix 6D**.

6.5.16 The use of proximity activated lighting is preferred and SNH has advised that this could result in the lights being activated for less than 2% of the time. Although used in Europe and elsewhere, proximity activated lighting is not currently approved for use in the UK.

On-site Wind Farm Tracks

6.5.17 A total of approximately 28.7km of new wind farm tracks would be constructed. Temporary passing places (up to 33m x 4m) would also be provided every 500m (as required). Wind farm track junctions and bell-mouths would be present throughout the Development Site and bridge and culvert type water crossings would be required in some places as part of these tracks (see **Figure 4.1**).

6.5.18 The wind farm tracks where visible from Viewpoints 1, 2, 3, 4, 5, 6, 7, 24 and 25 are illustrated in **Figures 6.24, 6.25, 6.26, 6.27, 6.28, 6.29, 6.30, 6.46** and **6.47** respectively.

6.5.19 At the earliest opportunity on the completion of erection of turbines, the edges of the wind farm tracks would be re-turfed with peat and encouraged to re-generate to reduce local visual impact during the operational period.

Substation Building Compounds

6.5.20 The main substation and two secondary substations would be visible from very small sections of the A858 and A859, and elevated vantage points beyond the Development Site as confirmed by site visits and ZTV analysis. The substation buildings are illustrated in **Figures 4.10a-b** and would be a single storey structure with car parking. Their colour would be selected to have a low contrast with the surrounding *Boggy Moorland (Boggy Moor 1*) and the development would be enclosed by a 2.7m high perimeter fence with a low visibility style and colour.

6.5.21 To maintain the amenity and simplicity of the *Boggy Moorland (Boggy Moor 1*), the colour of the associated battery and switchgear containers would be co-ordinated with that of the substations to have a low contrast with the surrounding moorland. These would also be enclosed by a 2.7m high perimeter fence with a low visibility style and colour.

Grid Connection

6.5.22 The grid connection for the Proposed Development would extend east from the Development Site, north of Creed Enterprise Park to Arnish Yard approximately 5km to the southeast. The anticipated grid connection route is illustrated in **Figure 4.13** and would be subject to a separate application.

Construction Mitigation

6.5.23 The construction of the Proposed Development would draw upon the guidance set out in SNH guidance Good Practice during Wind Farm Construction[3]. The key measures that would be implemented as part of the Construction Method Statement (CMS) and the supporting Environmental Management Plan (EMP) to avoid or reduce potential construction related effects include:

- The selective and sensitive location of temporary storage areas for materials, plant, and security fencing;
- Use of designated routes around the site for construction vehicles and operation of construction plant. Avoiding the creation of any 'wheel ruts' or related damage to land and vegetation, and subsequent clear up or repair of these;
- Implementation and monitoring of site management procedures, such as regular litter sweeps to ensure the removal of all litter arising from the construction activities; and
- Reinstatement of all temporary construction compounds, site offices, areas of former hardstanding, parking areas and any related temporary construction facilities.

On-Site Borrow Pits

6.5.24 Five potential borrow pits have been identified and these are located as shown on **Figures 4.12a-e**. Indicative plans of each borrow pit are provided which have been used to inform the LVIA.

6.5.25 Following completion of construction, the borrow pits would be restored to ensure that the ground is stable and to improve their visual appearance. A detailed reinstatement plan and programme would be developed, drawing upon the advice of a landscape architect and an ecologist, and implemented in agreement with CnES, SNH and SEPA to ensure that proposed reinstatement materials and techniques are suitable. It is anticipated that steep faces would be graded to fit with the surrounding topography and disturbed surfaces would be reinstated with peat previously excavated from the turbine infrastructure and borrow pit areas.

Operational Mitigation

6.5.26 The operation of the Proposed Development is expected to cover a period of 25 years and include management to ensure the adequate maintenance of site facilities and landscape features such as access tracks, field boundaries, gates and signage.

[3] Good Practice during Windfarm Construction, A joint publication by Scottish Renewables, Scottish Natural Heritage, Scottish Environment Protection Agency, and the Forestry Commission Scotland; Version 3, October 2015.

Decommissioning Mitigation

6.5.27 The decommissioning period is expected to take approximately 6 months. All of the visible, above ground structures (turbines, transformers, substation and control building) would be removed upon decommissioning and any disturbed areas reinstated, thereby rendering the vast majority of the landscape and visual effects as reversible.

6.5.28 Some wind farm tracks may remain in perpetuity. Their retention or removal would be identified through a decommissioning plan before the decommissioning of the wind farm.

6.6 Mitigation and Enhancement Measures

6.6.1 All of the mitigation related to landscape, visual and cumulative effects is 'built-in' or embedded into the design of the Proposed Development or otherwise applied as described in **Chapter 3** and **Section 6.4** and no additional mitigation or enhancement is proposed.

6.6.2 A summary of the mitigation measures embedded into the design of the Proposed Development and any opportunities for enhancement are provided in **Table 6.8**.

Table 6.8 Mitigation and Enhancement Measures

Proposed Development	Description of proposed Mitigation and Enhancement
Proposed Development Site Infrastructure	
Wind Turbines	All turbines will be three-bladed in standard pale grey with no logos. Transformers to be a suitable colour to blend into the background moorland landscape. Redundant hardstanding areas to be reinstated post construction.
Turbine Lighting	No mitigating alternative is currently available for aviation warning lights on turbines ≥150m in height to blade tip. An assessment of the night-time effects of turbine lighting is provided in **Appendix 6D**.
On-site wind farm tracks	The on-site access tracks would create an enhancement opportunity for a recreational route once the Proposed Development is operational.
Main and Secondary Substations (including battery storage facilities)	In order to maintain the amenity and simplicity of the *Boggy Moorland LCT*, the colour of the control buildings (including battery and switchgear containers) would be coloured to have a low contrast with the surrounding moorland. The development would be enclosed by a 2.7m high perimeter fence with a low visibility style and colour.
Areas of Proposed Plantation Forestry	The proposed areas identified in Figure 9G.1 (potential habitat enhancement search areas) would be planted with native species which would enhance the landscape character of the Boggy Moorland or provide additional habitat for hen harrier. This would be subject to agreement with SNH.

Proposed Development	Description of proposed Mitigation and Enhancement
Construction Mitigation	The development of the wind farm would draw upon the guidance set out in SNH guidance '*Good Practice during Wind Farm Construction*' with key measures implemented, as part of the CMS and the supporting EMP as well as the following: • The selective and sensitive location of temporary storage areas for materials, plant, and security fencing; • Using designated routes around the site for construction vehicles and operation of construction plant. Avoiding the creation of any 'wheel ruts' or related damage to land and vegetation, and subsequent clear up or repair of these; • Implementation and monitoring of site management procedures, such as regular litter sweeps to ensure the removal of all litter arising from the construction activities; and • Reinstatement of all temporary construction compounds, site offices, areas of former hardstanding, parking areas and any related temporary construction facilities.
On-Site Borrow Pits	Following completion of construction, borrow pits would be restored to ensure that the ground is stable, safe and improve their visual appearance. The restoration plan for each borrow pit would draw on the advice of a landscape architect and an ecologist and would be designed in line with the proposed reinstatement matierals and techniques available. It is anticipated that steep faces would be graded out to fit with the surrounding topography and disturbed surfaces covered with soil and re-seeded or re-turfed.
Operation Mitigation	Maintenance of site facilities and landscape features such as access tracks, field boundaries, plantation forestry, gates, and signage.
Decommissioning	All visible, above ground structures (turbines, transformers, main and secondary substations) would be removed upon decommissioning and any disturbed areas reinstated. Some wind farm tracks may remain in perpetuity, for use by landowners and walkers, creating an enhancement opportunity.

6.7 Residual Landscape Effects

6.7.1 Landscape Effects are defined by the Landscape Institute in GLVIA 3, paragraphs 5.1 and 5.2 as follows.

"An assessment of landscape effects deals with the effects of change and development on landscape as a resource. The concern … is with how the proposal will affect the elements that make up the landscape, the aesthetic and perceptual aspects of the landscape and its distinctive character. … The area of landscape that should be covered in assessing landscape effects should include the site itself and the full extent of the wider landscape around it which the proposed Development may influence in a significant manner."

6.7.2 These effects are assessed by considering the landscape sensitivity (value and susceptibility) against the magnitude of change. The assessment takes account of the cumulative landscape effects, 'in addition' to, and 'in combination' with, other existing and consented wind energy development, as set out in **Table 6.4**; and the periods of remaining operation of existing and consented wind energy development as set out in **Table 6.6**. The type of effect may also be described as temporary or permanent, direct or indirect, cumulative and positive, neutral, or negative.

6.7.3 The residual landscape effects assessed here are those effects remaining after all of the embedded design mitigation and enhancement measures referred to in **Table 6.8** have been taken into account.

Effects on Landscape Character: *Boggy Moorland* - Boggy Moor 1

6.7.4 The landscape character within the 35km Study Area is illustrated in **Figure 6.14**. Landscape character within 15km and within 5km of the Proposed Development at a more detailed scale is further illustrated in **Figures 6.15a-b**.

6.7.5 The 'host' landscape for the Proposed Development is an extensive area of *Boggy Moorland* LCT within the northern half of the Isle of Lewis. The area of landscape within the Development Site is more locally identified as *Boggy Moor 1* - large-scale, gently undulating peat moorlands where lochans are occasional rather than a main feature.

6.7.6 The landscape character of the *Boggy Moor 1 LCT* is described within the SNH Capacity Study as follows:

"These landscapes are essentially simple, flat, open and large scale. They would relate physically to the largest typology and could accommodate an extensive development….." <u>*(Medium-High capacity to commercial wind farm development as defined by SNH*</u>)

Landscape Sensitivity of the Development Site in the *Boggy Moorland - Boggy Moor 1* LCT

6.7.7 The landscape assessment has been undertaken in accordance with GLVIA 3 and the methodology and glossary set out in **Appendix 6A**. The glossary defines the terms landscape sensitivity and capacity as follows:

- *"Landscape Sensitivity: The sensitivity of the landscape to a particular development considers the susceptibility of the landscape and its value;*
- *Landscape Capacity: The ability of a landscape to accommodate different amounts of change or development of a specific type. Capacity reflects the landscape's sensitivity to the type of change, and the value attached to the landscape, and is therefore dependent on judgements about the desirability of retaining landscape characteristics and the acceptability of their loss."*

6.7.8 It should be noted that this is slightly different to the definition of landscape sensitivity and capacity used in the SNH Capacity Study, which is a strategic study, applied to *Boggy Moorland (Boggy Moor 1)* across the Western Isles as a whole. In comparison, the LVIA is a specific assessment of the effects of the Proposed Development upon the Development Site and the wider *Boggy Moorland.*

6.7.9 Factors that were considered as part of this assessment however include reference to all of the Landscape Sensitivity Criteria considered as part of the SNH Capacity Study as well as the revised cumulative baseline and the landscape quality, in order to assess the landscape susceptibility (as defined in **Appendix 6A**), value and subsequent sensitivity to the Proposed Development in accordance with GLVIA 3 (paragraph 5.39).

<u>*Physical Criteria*</u>

Landscape Scale and Openness

6.7.10 *Boggy Moor 1* is a large scale, extensive and open landscape, a characteristic which is a well-established indicator of reduced sensitivity and increased capacity to accommodate large scale wind farm development. Open and exposed landscapes allow wind farm development to be viewed within a simple landscape setting and the Site would be located on a relatively flat landscape and not where there are more variations in landform where the landscape scale and openness is slightly reduced. The existing Beinn Ghrideag turbines are located within the Development Site and Pentland Road turbines are located just to the north. The landscape susceptibility is considered to be Low within the majority of the Development Site, increasing to Low to Medium on the eastern edge of the Development Site in areas closer to the settlement of Stornoway (including Greater Stornoway).

Landform and Shape

6.7.11 The simple landform with some occasional variations is a well-known indicator of reduced sensitivity and increased capacity to accommodate large scale wind farm development providing the development avoids these low individual peaks as noted in the SNH Capacity Study, and as in this case. The existing Pentland Road Wind Farm is, however, located on one of these local peaks in the north. The landscape susceptibility is considered to be Medium to Low.

Settlement

6.7.12 *Boggy Moor 1* is largely uninhabited. The landscape susceptibility is considered to be Low within the majority of the Development Site, increasing to Low to Medium on the eastern edge of the Development Site in areas closer to the settlement of Stornoway (including Greater Stornoway).

Landscape Pattern and Foci

6.7.13 *Boggy Moor 1* is acknowledged to have a simple moorland pattern and this simplicity is another acknowledged indicator of reduced sensitivity and increased capacity to accommodate large scale wind farm development, except for areas where water bodies are more numerous and create intricate patterns. Foci tend to be occasional water bodies, low peaks that occur, peat hags or cultural elements on the fringes. The SNH Capacity Study notes that wind farm development could dominate small scale features such as low peaks. It is also acknowledged that water bodies are more prevalent in *Boggy Moor 2* than *Boggy Moor 1*. The landscape susceptibility is assessed as Medium to Low.

Visual Composition

6.7.14 A simple visual composition generally exists, except where landform variations and water bodies occur. There are views of existing wind farms and other vertical development within this landscape. The landscape susceptibility of the Development Site is assessed as Medium to Low.

Effects on other LCTs

6.7.15 The open and extensive landscape of *Boggy Moor 1* provides a backdrop from the smaller LCTs such as *Rocky Moorland, Cnoc and Lochan and Crofting*. The Proposed Development is set back from these LCTs and would be visible (alongside existing wind farms) beyond the open, moorland landscape and any intervening landform. The landscape susceptibility is considered to be Low within the majority of the Development Site, increasing to Low to Medium to the east and southeast of the Development Site in areas closer to these smaller LCTs.

Perceptual Qualities

How Landscape is Experienced

6.7.16 The SNH Capacity Study relates this criterion to the sense of scale and visibility of extensive areas without having to walk into the interior. It also states that *"there are few reference points in these landscapes particularly in North Lewis and so orientating oneself can be difficult."* Since the publication of the Capacity Study, there have been several wind farm developments which now provide reference points in the landscape, one of which (Beinn Ghrideag) is within the Development Site. The landscape susceptibility is assessed as Medium to Low.

Context

6.7.17 The SNH Capacity Study states that:

"From certain points on Lewis there are expansive views from the roads through the Boggy Moor over the sea to the mainland. The combination of Boggy Moor, Rocky Moor and Mountain Massif often produces a seamless transition from flat plane to mountain top over long range views and these are particularly striking, producing key vistas (for example views to the south from Achmore)."

6.7.18 The susceptibility to change from the introduction of the Proposed Development would be Medium to Low due to the presence of several existing turbines. The Proposed Development would not be visible in views to the south from Achamore.

Remoteness/Modification/Naturalness

6.7.19 The SNH Capacity Study identifies perceptual qualities of 'remoteness', 'modification, and 'naturalness' as relevant qualities. Further assessment of these qualities is provided as follows.

- Perceptions of Remoteness / Seclusion
  - Considering the Proposed Development's location relative to the settlement of Stornoway and other wind farm development; the perceptual qualities of remoteness are not as strong as in other less modified areas of *Boggy Moor 1*, remote from settled landscapes and main roads. Ironically the presence of wind turbines can also emphasise the remote, isolated and wind-swept nature of the landscape particularly as the development itself is uninhabited and visually permeable in character.
- Perceptions of Naturalness
  - Perceptual qualities of naturalness require a landscape to be predominantly covered in semi-natural vegetation or natural land cover as opposed to areas of visually more obvious agricultural / forestry management or built development. Whilst the Development Site is one of moorland vegetation, there is also visibility of wind farm development and plantation forestry which co-exists with this quality.
- Modification
  - 'Modification' is noted "*in transitional areas between moor and Crofting types this landscape can be heavily modified by reseeding, peat cutting, tracks, forestry and communications artefacts. There are extensive areas of modification on the fringes of this type and some high structures (masts, MoD artefacts) which are highly visible over a large area. These modifications change the character and reduce the perception of remoteness and isolation.*" Modification is noted within the Development Site by the presence of existing wind farm development, a landfill site at Loch Airigh na Lic, and the A858 which crosses through the north of the Development Site. As a result, the sensitivity of this quality is reduced within the Development Site.

6.7.20 Considering these perceptual qualities together an assessment of Medium to Low susceptibility is applied to the Development Site.

Visibility

6.7.21 The SNH Capacity Study notes that "*Boggy Moor areas, although having upland characteristics, are generally low lying and routes across are often slightly elevated giving panoramic views across this type. Visibility is high within the type and from roads through or adjacent to it where open views across the moor are common. Tracks would only be seen from elevated positions*." The Capacity Study also notes that there is a higher level of visibility across the LCT with taller turbine types (a 'medium' level of visibility). However, the presence of existing turbines within and around the Site reduces this and an assessment of Medium to Low susceptibility is applied to the Development Site.

Landscape Value

6.7.22 *Boggy Moor 1* is not designated locally or nationally for its scenic value. In terms of public access and recreational use there are relatively few tracks off the main sealed roads indicating that this is not a landscape which is regularly accessed for recreational purposes outside of the A858 and Pentland Road which double as long-distance routes (Hebridean Way and Timeless Way). Neither is this landscape associated with any particular artistic, cultural or literary associations.

6.7.23 As a result, an assessment of Medium to Low value is applied to the Development Site.

Overall Sensitivity

6.7.24 The sensitivity of the *Boggy Moorland - Boggy Moor 1* LCT is considered to be **Medium to Low.** This concurs with the SNH Capacity Study, noting that this study was written in the absence of the Consented Development. It is noted that the introduction of wind farm developments within the *Boggy Moorland - Boggy Moor 1* LCT since the publication of the SNH Capacity Study have further influenced the overall sensitivity for this LCT.

Magnitude and Level of Effect on *Boggy Moorland - Boggy Moor 1*: During Construction

6.7.25 The construction phase would result in localised, direct effects on the landscape character of the Development Site and its component landscape elements. **Table 6.9** provides an assessment of the level and type of landscape effect predicted in respect of each construction activity.

6.7.26 Visualisations of the Proposed Development are provided from 27 viewpoint locations and illustrated in **Figures 6.24a-e** to **6.50a-e**.

Table 6.9 Landscape Effects from Construction to Operation of the Proposed Development

Proposed Development	Assessment
Wind Turbines	The construction of each turbine and associated crane hardstanding would affect a small portion of the Development Site moorland which is of Low sensitivity. The magnitude of change would be Low, such that the level of effect on landscape elements (moorland vegetation) would be Negligible and not significant, temporary, direct, and neutral. Where turbines are located within existing areas of plantation forestry, the forestry would be felled within a radius of each turbine and may be replanted as illustrated in **Figure 9B.3**, or as agreed with SNH during consultation. The magnitude of change would be Medium-Low (through the felling of plantation forestry), such that the level of effect on plantation forestry would be Moderate / Slight and not significant. In terms of landscape character, the turbines would add further built development (although reversible) as part of the overall construction activity. The magnitude of change would range from Zero through to High at the end of the construction period.

Proposed Development	Assessment
	Through examination of visualisations it is considered that once constructed, the geographical extent of significant effects would extend out approximately 1km of each turbine (**Substantial / Moderate** effect, resulting from Medium-Low sensitivity and High magnitude), up to 2-3km in the east and southeast (**Substantial / Moderate to Moderate** effect, resulting from Medium-Low sensitivity and High magnitude), up to 3km in the south and north and up to 5km in the west (**Substantial / Moderate to Moderate** effect, resulting from Medium to Low sensitivity and High-Medium / Medium magnitude). The nature of these effects would be **significant**, long-term (reversible), direct and negative. Mitigation measures to reduce the impact of the turbines have been embedded into the design as part of the design evolution described in **Section 6.5** and **6.6** of this Chapter. The level of effect would generally reduce with increased distance from the turbines such that the effects on landscape character would not be significant beyond approximately 2-5km as described above, although there are likely to be **significant** visual effects.
Construction Lighting	During the construction period, some limited health and safety lighting would be required at the Development Site entrance office and temporary construction compounds; and there would also be lights from vehicles moving around the site during periods of darkened daylight hours such as heavy rain / dark skies. Cranes may also carry aviation warning lights in accordance with Article 222 of the UK ANO 2016. The effects of these temporary lights on the night-time landscape character *Boggy Moor 1* LCT would be **Substantial / Moderate** and **significant** but limited to a more localised geographical area, extending out to approximately 2km from the light source locations due to their lower light intensity and fewer number (it is assumed that there would be 1-2 cranes with aviation warning lights operating on site during this period). The nature of these effects would be temporary, direct and negative.
On-site Wind Farm Tracks and Water Crossings	Approximately 28.7km of wind farm track is required, including associated crane pads, laybys and turbine areas. This would directly affect areas of moorland vegetation, plantation forestry and occasional water courses (where crossings are required) and other landscape features of Low to Medium sensitivity. The affected area would be small in comparison to this overall landscape resource and the magnitude of change would be Medium-Low to Zero such that the level of effect on landscape elements would be Moderate / Slight and not significant, temporary, direct, and negative. In terms of landscape character, the wind farm tracks would add further long-term built features to this landscape that would be visible as part of the wind farm from elevated positions and small parts of adjoining routes (A858 / Hebridean Way / Timeless Way / Pentland Road). The magnitude of change would range from Medium within approximately 25m to 50m of the wind farm tracks, quickly reducing to Low / Zero levels, subject to visibility. It is likely that the wind farm tracks would contribute to Moderate to Slight localised landscape effects on the landscape character of the Development Site area during construction, considering their overall scale and spread. Mitigation measures to reduce the visual impact of the wind farm tracks would be carried out at the end of the construction period. Considering the wider *Boggy Moorland - Boggy Moor 1* LCT, this would amount to a not significant effect on the landscape character and its overall integrity.
Main and Secondary Substations	There would be one main substation compound, measuring approximately 150 x 80m and containing a control building, switchgear building, battery storage and associated car parking / hardstanding. In addition, there would be two secondary substations, measuring 80 x 80m, one on either side of the A858. There would be a loss of moorland vegetation of Low sensitivity that would amount to a very small quantity of this overall landscape resource. The magnitude of change would be Low such that the level of effect on landscape elements (moorland vegetation) would be Slight to Slight / Negligible and not significant, long-term (reversible), direct, and negative. In terms of landscape character, the substation buildings would add further built development to this landscape as part of the overall construction activity. The magnitude of change would range from High within approximately 250m of the Proposed Development, reducing to Low within approximately 1km, such that the substation buildings would contribute to a **Substantial / Moderate to Moderate** Significant localised**,** landscape effect (within approximately 250m) of the landscape character of the site area during construction.

Proposed Development	Assessment
	Considering either the site as a whole or the wider *Boggy Moorland - Boggy Moor 1* this would amount to a Not Significant effect on the landscape character and overall integrity of the *Boggy Moorland - Boggy Moor 1*.
Electrical Cables	All electrical cables would be routed underground, along wind farm track verges. The landscape effect would be Negligible to No View and not significant. The nature of these landscape effects would be temporary, direct, and neutral during construction and upon completion.
Temporary Construction Compound	There would be one temporary construction compound located to the southeast of the Development Site. This would be a maximum of 150 x 80m. In addition, there would be three smaller satellite compounds / storage / laydown areas (**Figure 4.1**) measuring 100 x100m. One of these would be located within an area of plantation forestry. The area of affected moorland vegetation (Low sensitivity) would be very small in comparison to this overall landscape resource and the magnitude of change would be Low-Negligible such that the level of effect on landscape elements (moorland vegetation) would be Slight / Negligible and not significant, temporary, direct, and negative. There would also be approximately 1ha of plantation forestry felled (100 x 100m) which may be replanted as illustrated in **Figure 9B.3** or as agreed in consultation with SNH. The magnitude of change would be Medium-Low such that the level of effect on landscape elements (plantation forestry) would be Slight and not significant. In terms of landscape character, the construction compounds would add further built development (although temporary over a short-term period) to this landscape as part of the overall construction activity. The magnitude of change would range from High within approximately 250m of the compounds, reducing to Low / Zero within approximately 1km, such that the compounds would contribute to a **Substantial / Moderate to Moderate significant** localised**,** landscape effect (within approximately 250m) of the landscape character of the Development Site area during construction. The nature of these effects would be temporary, direct, and negative. Considering either the site as a whole or the wider *Boggy Moorland - Boggy Moor 1* LCT this would amount to a not significant effect on the landscape character and overall integrity of the *Boggy Moorland - Boggy Moor 1*.
On-Site Borrow Pits	Up to five borrow pits are proposed within the Development Site and these have been assessed in outline with the assumption that each borrow pit would take the form of an excavation area, as indicated on **Figures 4.12a-e**. The affected area would be small in comparison to this overall landscape resource and the magnitude of change would be Low to Zero such that the level of effect on landscape elements would be Slight / Negligible, temporary, direct, negative and not significant. In terms of landscape character, the borrow pits would add further permanent development to this landscape that would be visible as part of the wind farm from elevated positions and limited locations on routes. The magnitude of change would range from High within approximately 100-250m of each borrow pit, quickly reducing to Low to Zero levels, subject to visibility from the wider site area. It is likely that each borrow pit would contribute to a **Substantial / Moderate and significant,** localised effect on the landscape character of the Development Site area during construction. These effects would however be partly temporary (subject to restoration) direct, and negative during the construction period. It is anticipated that the restoration process would restore the character of the existing *Boggy Moorland - Boggy Moor 1* and blend the excavations into the surrounding natural topography (as illustrated in **Figures 4.12a-e**), reducing the magnitude to Low and leading to Slight to Negligible residual effects, post restoration which would be not significant. These residual effects would however be permanent, direct, and neutral on completion. Allowing for restoration and considering either the site as a whole or the wider *Boggy Moorland - Boggy Moor 1* LCT these works would amount to a not significant effect on the landscape character and overall integrity of this LCT. The final design of the borrow pits would be subject to approval pursuant to planning condition and would ensure that the effects are no greater than those assessed above.

Proposed Development	Assessment
Plantation Forestry	Up to 41.4ha of plantation forestry would be felled to accommodate the erection of up to eight turbines and parts of the access track, as set out in Figure 8G.1 in **Appendix 8G** and also in **Appendix 9J.** The area of affected plantation forestry (Low sensitivity) would be small in comparison to the other areas of forestry in the wider landscape and the magnitude of change would be Medium-Low such that the level of effect on landscape elements (plantation forestry) would be Moderate to Moderate / Slight and not significant, permanent, direct, and negative. NAreas of existing forestry are set out in Figure 9B.3, and seach areas for potential newhabitiat have been identified on Figure 9G1 in **Appendix 9G** and are further illustrated in the visualisations for viewpoints 1 – 7 and 25, where visible. The magnitude of change on the new areas of plantation forestry would range from High-Medium within approximately 250m of the forestry areas, reducing to Low / Zero within approximately 1km, such that the areas of plantation forestry would contribute to a **Substantial / Moderate to Moderate significant** localised**,** landscape effect (within approximately 250m) of the landscape character of the Development Site during construction. The nature of these effects would be permanent, direct, and positive or neutral. Considering either the Development Site or the wider *Boggy Moorland - Boggy Moor 1* LCT, this would amount to a not significant effect on the landscape character and overall integrity of this LCT.

6.7.27 The main landscape element affected by the Proposed Development would be moorland vegetation (Low sensitivity). However, this would directly affect a relatively small area of the wider moorland vegetation within the Development Site and / or the *Boggy Moorland - Boggy Moor 1* LCT as a whole. Hence the magnitude of change overall would be Low, resulting in a Slight effect on this particular element that would be not significant. The nature of these effects would be temporary (subject to restoration) or permanent (in respect of the wind farm tracks) direct, and negative during the construction period.

6.7.28 Small areas of plantation forestry would also be felled in places within the Development Site. This could be offset by new areas of potential habitat enhancement areas identified in **Figure 9B.3** and this would thereby strengthen the existing forestry boundaries as a feature in the landscape. The magnitude of change would be High-Medium, resulting in a **Substantial / Moderate** effect on this particular element within the Development Site that would be **significant**. The nature of these effects would be permanent, direct and positive or neutral, during the construction period.

6.7.29 Taking account of the Proposed Development, the landscape character effects on the *Boggy Moorland - Boggy Moor 1* (Medium to Low landscape sensitivity), the magnitude of change would range from Zero through to High at the end of the construction period, mainly as a result of the erection of the wind turbines. The overall effect on the landscape character of the *Boggy Moorland - Boggy Moor 1* would be None (at the start of the construction phase) increasing to **Substantial / Moderate** and significant on completion. Geographical significant effects would extend out to 1km from each turbine and up to 2-3km in the east, 3km in the north and south / southeast, and 5km in the west.

6.7.30 Localised **significant** effects would also occur as a result of the substations (**Substantial / Moderate to Moderate**); the temporary construction compounds (**Substantial / Moderate to Moderate**); the borrow pits (**Substantial / Moderate**) and plantation forestry (**Substantial / Moderate**). Construction of the wind farm tracks and associated crane hardstandings and turbine areas is considered as not significant (Moderate / Slight effect).

6.7.31 The duration of these effects would be short-term according to the construction period but leading on to long-term (reversible) effects for those components of the development that would be retained through the anticipated 25 year operational period (substation buildings and wind farm tracks). The short-term effects of the borrow pits are anticipated to reduce to Slight residual effects, post restoration which would be not significant.

6.7.32 The nature of these effects would be temporary or long-term, direct, and negative (or positive / neutral with regards to plantation forestry) during the construction period.

6.7.33 The Proposed Development would result in a **significant** effect on the landscape character within 1-5km of the turbines, as described above. This amounts to approximately up to 15% of the total area of the host area of *Boggy Moor 1* LCT to the southeast (the percentage would be reduced when accounting for all of the areas of *Boggy Moor 1* on the Island). The effects on the *Boggy Moorland - Boggy Moor 1 LCT* as a whole would be not significant in overall terms. The nature of these effects would be temporary to long-term (reversible), direct, and negative, due largely to the nature of construction activity across the site during this period.

Magnitude and Level of Effect: on *Boggy Moorland - Boggy Moor 1* During Operation

6.7.34 During operation, the completed wind farm would gain a more 'settled' appearance when compared to the same area during the construction period, although Significant landscape effects would continue throughout the operational period.

6.7.35 The landscape character effects on the *Boggy Moorland - Boggy Moor 1* (Medium to Low landscape sensitivity and High to Medium magnitude) would range from **Substantial / Moderate to Moderate** and **significant** within approximately 1km from each turbine and up to 2-3km in the east and southeast, 3km in the north and south, and 5km in the west (~15% of the host segment). The duration of these effects would be long-term through the anticipated 25 year operational period and reversible beyond this period as a result of the decommissioning. The nature of these effects would be long-term, direct, and negative.

6.7.36 Overall, the Proposed Development would result in a **significant** effect on the landscape character (affecting an area within 1km from each turbine and up to 2-3km in the east and southeast, 3km in the north and south, and 5km in the west) to the southeast of the *Boggy Moorland - Boggy Moor 1 LCT* affecting the areas of the Development Site and the immediately adjacent areas. There would be no significant effects on other areas of the *Boggy Moorland - Boggy Moor 1 LCT* on the Isle of Lewis. As a consequence, the effects on the *Boggy Moorland - Boggy Moor 1 LCT* as a whole would be not significant.

6.7.37 In practice, **significant** effects within the host area of the *Boggy Moorland - Boggy Moor 1* LCT would occur in the context of other wind farm development in this area and overlap with the cumulative effects of the adjacent Beinn Ghrideag, Pentland Road, Arnish Moor, Creed and Bridge Cottages wind farms which already have a significant characterising effect on this area.

Cumulative Landscape Effects on Boggy Moorland – Boggy Moor 1

6.7.38 There are seven existing wind farm developments within the *Boggy Moorland; Boggy Moor 1 LCT* and one consented site located close by that have a strong characterising influence on this LCT. These developments are as follows:

- Beinn Ghrideag Wind Farm (three turbines);
- Pentland Road Wind Farm (six turbines);
- Arnish Moor Wind Farm (three turbines);
- Creed (one turbine);
- Bridge Cottages (one turbine);
- Baile an Truiseil Wind Farm (two turbines);
- North Tolsta (one turbine); and

- The consented Druim Leathann Wind Farm (14 turbines) in the adjacent *Boggy Moorland - Boggy Moor 2 LCT*.

6.7.39 The existing Pentland Road, Beinn Ghrideag and Arnish Moor wind farms, already have a significant effect on the southeastern area of the *Boggy Moorland - Boggy Moor 1 LCT*. In addition, Creed and Bridge Cottages single turbines are also located to the southeast and add to the cluster of wind farm development in this part of the LCT. Elsewhere within the LCT there are several other scattered wind farm developments including Baile an Truiseil to the northwest and North Tolsta to the northeast. The consented Druim Leathann would be located within *Boggy Moor 2* to the northeast (near North Tolsta), however, it would influence the adjacent area of *Boggy Moor 1*.

6.7.40 The Proposed Development would be located within the existing cluster of wind farm development to the southeast of the *Boggy Moorland - Boggy Moor 1 LCT.* Beinn Ghrideag is situated within the Development Site and Pentland Road Wind Farm is located just beyond the Development Site to the northwest. Arnish Moor and Creed are also located within approximately 2km of the proposed turbines. Each of these wind farm developments have a High magnitude of effect within 1-2km of their respective turbines.

6.7.41 Baile an Truisel, North Tolsta and Druim Leathann wind farms are more distant from the Proposed Development, appearing more as separate isolated features within the landscape character, they have a reduced, but more dispersed effect on the Boggy Moorland overall (Low magnitude).

6.7.42 The additional cumulative effect of adding the Proposed Development to this baseline would therefore be tempered by the presence of the existing wind farms, where these developments are already a key characteristic of the landscape and where the effects of the Proposed Development would overlap with their existing effects. The Proposed Development would add to the density of wind farm development in this area and unify some of the separate wind farm developments within this cluster of developments in views.

6.7.43 As a result, the additional effect of the Proposed Development would be **Substantial / Moderate to Moderate** and **significant**. These effects however, are reduced in comparison to the 'solus' effect of the Proposed Development on its own in the southeastern part of the host area of *Boggy Moorland - Boggy Moor 1*. The nature of these effects would be cumulative, long-term (reversible), direct and negative to neutral, given the characterising influence of existing (and consented) wind farm development on this area.

6.7.44 The combined cumulative effect of the existing (and consented) and the Proposed Development on the *Boggy Moorland - Boggy Moor 1* would be **Substantial / Moderate** and **significant**, as a result of all of the wind farm development in this area. The nature of these effects would be cumulative, long-term (reversible), direct and negative.

6.7.45 Overall, the Proposed Development would result in a **significant** cumulative effect on the landscape character (affecting an area within 1-5km of the turbines). Other areas of the *Boggy Moorland - Boggy Moor 1* would be not significantly affected and the effects on the *Boggy Moorland - Boggy Moor 1* as a whole would be not significant.

Landscape Effects of Operational Timescales of other Existing and Consented Wind Farms

6.7.46 The predicted cumulative landscape effects are likely to continue unchanged over the first half (10-15 years) of the anticipated 25 year operational period of the Proposed Development.

6.7.47 During the last approximately 5 years of the operational period for the Proposed Development, all of the other existing and consented wind farms within 10km and within the current baseline (as listed in **Table 6.6**) would also cease to operate and be decommissioned (apart from the existing Arnish Moor Wind Farm which would cease 10 years before the end of the operational period of the Proposed Development). This would result in the elimination of all significant cumulative landscape effects associated with the Proposed Development. In this situation, the Proposed Development would appear as a single development designed to accord with the SNH guidelines[4] and the advice of the SNH Capacity Study, appearing as simple and cohesive wind farm development in the southeast part of the *Boggy Moorland - Boggy Moor 1* LCT.

Magnitude and Level of Effect *Plateau Moorlands*: During Decommissioning

6.7.48 During decommissioning, the Development Site would return to a 'construction site' for a temporary period and the level of effect would be variable over the Site and according to the phase of activity. Those parts of the Proposed Development remaining as permanent features within the landscape may include the access tracks which would be left in situ for future use by landowners, crofters, other stakeholders and for recreational purposes.

6.7.49 In overall terms the level of effect would reduce to non-significant levels (Low magnitude) and to Slight / Negligible levels of effect. The nature of these effects would be permanent, direct, and neutral to negative when compared to the pre-existing landscape[5] of the local area, although the areas of new plantation forestry could be a positive or neutral addition.

Indirect Effects on the Surrounding Landscape Character

6.7.50 Further LCTs within 15km and overlapped by the blade tip ZTV for the Proposed Development have been assessed in **Table 6.10**.

6.7.51 None of these landscapes would be directly affected by the Proposed Development as the turbines would not be located within them and there would be no change to their physical characteristics. Instead, potential effects on these landscapes would be limited to indirect effects on the visual or key perceptual characteristics, resulting from views of wind turbines.

6.7.52 In summary, there would be localised **significant** effects on small areas of three LCTs within 15km of the Proposed Development:

- *Gently Sloping Crofting (Crofting 1)* – on the western fringes of the LCT (Greater Stornoway) within 2-3km of the Proposed Development;
- *Rocky Moorland* – on the northwestern fringes of one area of LCT within 3km of the Proposed Development; and
- *Cnoc and Lochan* – on the northern fringes of one area of LCT within 3km of the Proposed Development.

6.7.53 The majority of the above LCTs and all of *Boggy Moor 2* would not be significantly affected by the Proposed Development.

6.7.54 Cumulative effects would also be **significant** on these areas of LCTs as a result of other existing and consented wind farms including Arnish Moor, Bridge Cottages and Creed, and the Proposed Development. Cumulative effects would also be **significant** on Boggy Moor 2 as a result of the existing North Tolsta and consented Druim Leathann wind farms, and not the Proposed Development. This pattern of development would remain constant through the first half of the operational period of the Proposed Development but would decrease over the latter half of that period as existing and consented wind farm development is decommissioned and removed. As a

[4] Siting and Designing Windfarms in the Landscape, Version 3a, Scottish Natural Heritage, 2017.

[5] The decommissioning has been compared to the pre-existing landscape ie assuming no construction of the Consented Development.

result, cumulative effects would reduce significantly (assuming that those schemes are not granted extensions to their operating periods or repowered).

6.7.55 Other LCTs within 15km have very limited ZTV coverage where the Proposed Development would only be partially visible and / or visible at distance where it would only be a minor feature in views and would not affect the characteristics of the LCTs. These LCTs are therefore excluded from the assessment on the basis that effects would be not significant. They include: *Linear Crofting (Crofting 2)* where there would be very fragmented areas of theoretical visibility, mostly between up to 1-8 turbines (often visible as blades)*; Dispersed Crofting (Crofting Three)* where there would be limited views of the proposed turbines; *Mountain Massif* where there are small areas of theoretical visibility at long distance, and the majority of the LCT located beyond 15km; and the *Machair 2* with very limited theoretical visibility at over 10km where the proposed turbines would appear as a distant feature.

Table 6.10 Indirect Effects on the Surrounding Landscape Character

Landscape Character	Assessment
Gently Sloping Crofting (Crofting 1)	The gently rolling settled landscapes of the *Gently Sloping Crofting (Crofting 1)* LCT extend along the northern and eastern coastlines of the Isle of Lewis. The closest of these landscapes is located approximately 1.5km east of the Proposed Development at Loch Airigh na Lic, extending from the edge of Greater Stornoway across to the Eye Peninsula / An Rubha. The key characteristics of the LCT as described in the SNH *LCA* (2019) are as follows: • *Long sweeping gentle slopes;* • *Large scale landscape with open views;* • *Dividing buffers of common land between townships;* • *Visually diverse due to land use management patterns;* • *Rectangular field patterns;* • *Graduation of landuse in the croft inbye from crops to grazing;* • *Paucity of trees limited to infrequent small areas of woodland;* • *Crofting settlement set back from the shore;* • *Repetitive pattern of croft houses backed by crofting strips;* • *Strong simple relationship between the older croft buildings and the management of individual croft strips;* • *Modern croft houses located behind original houses, of diverse design and constructed using diverse range of building materials;* • *Occasional development of new small/medium housing schemes of contrasting layout to the original crofts;* • *Remains of pre-crofting and prehistoric settlement, often including chapels and burial grounds, adjacent to the shore;* • *Constant views outwards to the sea and open moorland, giving a sense of remoteness;* • *Contrasting urban settlement of Stornoway.* The susceptibility to change is considered to be Medium due to the location of the Proposed Development outwith this area and the presence of other existing turbines and vertical elements that have an influence on western / southwestern views from this landscape towards the Proposed Development, in particular from the settlement of Stornoway. The landscape is undesignated for its scenic qualities, however, it offers opportunities to appreciate adjacent landscapes through open views from parts of the LCT, and the landscape value is therefore assessed as Medium. The sensitivity of the *Gently Sloping Crofting (Crofting One)* LCT is therefore assessed as *Medium*. <u>Assessment: Proposed Development</u> The ZTV coverage indicates that the greatest theoretical visibility of the Proposed Development would be from those areas of the LCT to the east and northeast of the Proposed Development within 15km (Stornoway, Eye Peninsula, Tunga and Coll). The assessment therefore focuses on these areas and excludes the areas at Baile Ailein and Laxay in the south, Barvas in the north, and Bayble on the Eye Peninsula due to very limited or no visibility of the Proposed Development (Negligible magnitude). Viewpoints 2, 9, 10, 12, 14, 18, 24, 25, 26 and 28 are all located in this LCT within 15km.

Landscape Character	Assessment
	The greatest effects on this part of LCT would be on the western fringes of Greater Stornoway (within approximately 2-3km of the proposed turbines) where the turbines would slightly extend the influence of human activity, however, other existing turbines at Beinn Ghrideag and Pentland Road, the landfill site at Loch Airigh na Lic and other man-made development would be visible in some views from these fringes (High to High-Medium magnitude). Given the large-scale of the landscape, the Proposed Development would not necessarily appear out of scale with the underlying landform, and there would be no direct, physical effects on the underlying topography or settlement pattern. The Proposed Development would be perceived as part of the adjacent Boggy Moor LCT to the west and the key characteristics of the *Gently Sloping Crofting* LCT would be retained. Much of this area of the LCT is characterised by the settlement of Stornoway to the east and southeast. From other areas of the LCT to the northeast and east, views are more distant, and the Proposed Development would not alter the key characteristics of this LCT (Low to Zero magnitude). The magnitude of change would range from High / High-Medium (within 2-3km) reducing to Low and Zero beyond and the addition of the Proposed Development would lead to a **Substantial / Moderate** and **significant** effect within approximately 2-3km of the Proposed Development to Moderate / Slight or less and not significant beyond 2-3km. <u>Cumulative Assessment: Proposed Development+ Existing + Consented Sites</u> There are no wind farm developments in this LCT within 15km. However the existing Bridge Cottages is located close to boundary of the LCT at Newmarket (High-Medium magnitude within 1-2km of the turbines reducing with increased distance). Other existing and consented wind farms including Beinn Ghrideag, Pentland Road, Creed and Arnish Moor would be visible from parts of this LCT and would exert a limited effect on landscape character (Low to Negligible magnitude). The existing North Tolsta and consented Druim Leathann turbines would be partially visible from the east / northeast areas of the LCT (Low magnitude), however would have greater effects on the LCT beyond 15km of the Proposed Development, considering their location on the edge of the LCT at Tolsta. The additional effect of the Proposed Development would remain **Substantial / Moderate** and **significant** within approximately 2-3km of the Proposed Development to Moderate / Slight or less and not significant beyond 2-3km. The combined cumulative effect would be **Substantial / Moderate** and **significant** (within approximately 2-3km), resulting from the Proposed Development and Bridge Cottages, reducing to Moderate / Slight or less and not significant beyond 2-3km. The nature of these effects would be long-term (reversible), cumulative, indirect and negative. Unless consent is granted to extend its operation, Bridge Cottages would be decommissioned approximately 5 years prior to the end of the operation of the Proposed Development, reducing this cumulative effect.
Boggy Moorland (Boggy Moor 2)	There are four areas of *Boggy Moorland (Boggy Moor 2)* LCT within 15km of the Proposed Development, one to the northeast and three to the southwest. The closest of these landscapes is located approximately 4km southwest of the Proposed Development at Achamore. The key characteristics of the LCT as described in the SNH *LCA* (2019) are the same as Boggy Moorland described above, however Boggy Moor 2 differs from Boggy Moor 1 as being more contained and limited, and where lochans are numerous creating a strong patterning, and interplay of land and water with reflective effects. The susceptibility to change is considered to be High-Medium due to the containment and limited areas of the landscape and due to the location of the Proposed Development outwith this area when compared to Boggy Moor 1. Parts of the LCT in the southwest are designated as a Wild Land Area and the overall value of the landscape is assessed as High-Medium. The sensitivity of the *Boggy Moorland (Boggy Moor 2)* LCT is therefore assessed as *High-Medium*. <u>Assessment: Proposed Development</u> The ZTV coverage indicates that the greatest theoretical visibility of the Proposed Development would be from one of the four areas of this LCT located between 4-12.5km to the southwest beyond Achamore. From the three remaining areas, visibility of the Proposed Development would be very limited (Low-Negligible to Zero magnitude), and the area to the northeast would be affected by the consented Druim Leathann Wind Farm located within the LCT, and the existing North Tolsta turbine located on the edge of the LCT. These areas are therefore excluded from the assessment on the basis that effects would be of Negligible magnitude and not significant. Viewpoint 20 is located within this LCT, in the southwest. Within 5km, there would be theoretical visibility of between zero and up to 1-17 turbines across most of this landscape to the southwest with theoretical visibility of up to 27-35 turbines indicated at Oldreabhal hill (where mainly hubs and blades are visible).

Landscape Character	Assessment
	Although parts of the Proposed Development would be visible from this area of the LCT to the southwest, there would be a sense of separation from the turbines and it would be perceived as being part of the background to the wider landscape (Low to Zero magnitude). It is considered that the Proposed Development would not significantly alter the existing landscape character and would not significantly affect the key perceptual characteristics of this area of the LCT to the southwest. The magnitude of change would range from Low to Zero and the addition of the Proposed Development would lead to a Moderate / Slight to Slight to None and not significant. The nature of these effects would be long-term (reversible), indirect and negative. <u>Cumulative Assessment: Proposed Development+ Existing + Consented Sites</u> There are no existing or consented wind farms within this area of the LCT in the southwest. Other existing and consented wind farms would have a limited influence on this area of the LCT considering their distance and lower magnitude. The additional effect of the Proposed Development would remain Moderate / Slight to Slight to None and not significant. The combined cumulative effect would also remain the same at Moderate / Slight to Slight to None and not significant. The nature of these effects would be long-term (reversible), cumulative, indirect and negative.
Rocky Moorland – Outer Hebrides	There are several areas of *Rocky Moorland* within 15km of the Proposed Development to the south, southeast, west and northwest. The closest of these landscapes is located approximately 1.9km southeast of the Proposed Development. The southeastern parts of this landscape are already influenced by the existing Creed and Arnish Moor Wind Farms. The key characteristics of the LCT as described in the SNH *LCA* (2019) are as follows: • *Rocky, stepped landscape with irregular topography;* • *Rocky knolls interlocked with peaty moorland vegetation and small lochans;* • *Considerable diversity of form and texture;* • *Occasional areas of forestry, small woodlands and shelter planting;* • *Medium scale;* • *Predominantly uninhabited and sense of remoteness.* The susceptibility to change is considered to be Medium due to the location of the Proposed Development outwith this area, and the close proximity of the existing Creed and Arnish Moor turbines to this LCT (and the existing Horshader turbine located within this LCT to the northwest beyond 15km). Parts of the LCT in the southwest are designated as a Wild Land Area and the overall value of the landscape is assessed as High-Medium. The sensitivity of the *Rocky Moorland* LCT is therefore assessed as High-Medium. <u>Assessment: Proposed Development</u> The ZTV coverage indicates that the greatest theoretical visibility of the Proposed Development would be from two areas of the LCT in the southeast, south and southwest within 10km. The assessment therefore focuses on these areas and excludes those further to the west and southwest beyond 10km due to very limited or no visibility of the Proposed Development (Negligible magnitude). Within the two closest areas of *Rocky Moorland,* ZTV coverage indicates patchy theoretical visibility of the Proposed Development. In the area of the LCT to the southeast, theoretical visibility is indicated across much of this area. Although the proposed turbines would have the greatest influence where they are nearest to the LCT (on the northwestern fringes within 3km), they would be seen across a large-scale moorland landscape and would not have a direct, physical effect on the *Rocky Moorland* features. The turbines become more of a distant feature further to the south of the LCT where the key features of the *Rocky Moorland* become more evident. The Proposed Development would be perceived as part of the adjacent *Boggy Moor 1* LCT to the northwest and the key characteristics of the *Rocky Moorland* LCT would be retained (Medium to Zero magnitude). In the area of the LCT to the south, there would be theoretical visibility from the north facing slopes of Nisreabhal hill at approximately 4km distance where the proposed turbines would be seen as hubs and blades beyond intervening rising landform, and limited visibility beyond (Low to Zero magnitude). It is therefore considered that the Proposed Development would not alter the key characteristics of the two areas of LCT within 15km. The magnitude of change would range from Medium within 3km, reducing to Low and Zero beyond. The addition of the Proposed Development would lead to a **Substantial / Moderate** and **significant** effect (on the northwestern fringes of the area of the LCT, southeast of the Proposed Development within 3km) to Moderate / Slight or less and not significant (beyond 3km on the majority of the LCT). The nature of these effects would be long-term (reversible), indirect and negative. <u>Cumulative Assessment: Proposed Development+ Existing + Consented Sites</u>

Landscape Character	Assessment
	The existing Arnish Moor and Creed turbines are located very close to the southeastern area of the LCT (High to Medium magnitude within 2km, reducing with increased distance). Pentland Road and Beinn Ghrideag Wind Farms are also visible from parts of the LCT and would exert limited effect on these areas of the LCT in the south and southeast (Low to Zero magnitude). The additional effect of the Proposed Development would reduce to Moderate and not significant (due to the presence of the existing Creed and Arnish Moor turbines affecting the same parts of the area of LCT to the southeast). The combined cumulative effect would be **Substantial to Substantial / Moderate** and **significant** (within 2-3km, resulting from Arnish Moor, Creed and the Proposed Development, reducing to Moderate / Slight or less and not significant (beyond 3km). The nature of these effects would be long-term (reversible), cumulative, indirect and negative. Unless consent is granted to extend their operation, Arnish Moor and Creed would be decommissioned approximately 5-10 years prior to the end of the operation of the Proposed Development, reducing this cumulative effect.
Cnoc and Lochan	There are several areas of *Cnoc and Lochan* within 15km of the Proposed Development to the south and southeast. The closest of these landscapes is located approximately 2.2km southeast of the Proposed Development. This landscape is already influenced by the existing Arnish Moor Wind Farm, located closer than the Proposed Development to this landscape. The key characteristics of the LCT as described in the SNH *LCA* (2019) are as follows: • *Steep-sided irregular outline of small cnocs, separated by depressions which frequently contain small lochans;* • *Intimate landscape scale with only short internal views;* • *Diversity of landform and contrasting textures, creating diverse microclimates;* • *Intensive use and reuse of small areas of cultivable land over thousands of years, with occasional patches of cultivated land creating focal features today.* Due to the intimate scale of this landscape, the susceptibility to change from the introduction of the Proposed Development is High, although the landscape is undesignated, indicating Medium value. The sensitivity of *Cnoc and Lochan* is therefore assessed as High. <u>Assessment: Proposed Development</u> The ZTV coverage indicates that the greatest theoretical visibility of the Proposed Development would be from one area of the LCT in the south within 5km. The assessment therefore focuses on this area and excludes those areas further to the south / southeast beyond 5km due to very limited or no visibility of the Proposed Development (Negligible magnitude). ZTV coverage of this area of LCT within 5km is patchy due to the undulating landscape. Although the proposed turbines would have the greatest influence where they are nearest to the LCT (on the northern fringes within 3km), they would be seen (hubs and blades) beyond intervening moorland and rising landform, and would not have a direct, physical effect on the *Cnoc and Lochan* features. The turbines become more of a distant feature further to the south of the LCT where the key features of the *Cnoc and Lochan* become more evident. The Proposed Development would be perceived as part of the adjacent *Boggy Moor 1* LCT to the north and the key characteristics of the *Cnoc and Lochan* LCT would be retained (Medium to Zero magnitude). It is therefore considered that the Proposed Development would not alter the key characteristics of the area of LCT within 5km. The magnitude of change would range from Medium (on the northern fringes of the LCT within 3km) reducing to Low and Zero beyond. The addition of the Proposed Development would lead to a **Substantial / Moderate** and **significant** effect (on the northern fringes of the LCT within 3km) to Moderate / Slight or less and not significant (beyond 3km on the majority of the LCT). The nature of these effects would be long-term (reversible), indirect and negative. <u>Cumulative Assessment: Proposed Development + Existing + Consented Sites</u> There are no other existing or consented wind farms within this area of LCT. However, the Arnish Moor (Medium magnitude) and Creed (Low magnitude) Wind Farms would be visible in close proximity from the same parts of the LCT alongside the Proposed Development. Pentland Road, Pentland Road and Beinn Ghrideag Wind Farms are also visible from parts of the LCT and would exert limited effect on these areas of the LCT in the south (Negligible to Zero magnitude). The additional effect of the Proposed Development would reduce to **Moderate** and **significant** (due to the presence of the existing Arnish Moor, closer to the LCT than the Proposed Development). The combined cumulative effect would be **Substantial / Moderate** and **significant** (within 3km, resulting from Arnish Moor and the Proposed Development, reducing to Moderate / Slight or less and not significant (beyond 3km). The nature of these effects would be long-term (reversible), cumulative, indirect and negative. Unless consent is granted to extend its operation, Arnish Moor would be decommissioned approximately 10 years prior to the end of the operation of the Proposed Development, reducing this cumulative effect.

Landscape Designations

6.7.56 The Development Site is not designated at a local or national level and there would be no direct effects on landscape designations.

6.7.57 South Lewis, Harris and North Uist NSA is located within the 35km Study Area and the assessment has considered the effects of the Proposed Development on the overall integrity and special qualities for which it is designated. There are no other national or any local landscape designations within 15km of the Proposed Development.

6.7.58 With regard to the integrity of a valued landscape, SNH[6] advise that:

"The key test applied in relation to NSAs, but often employed for other valued landscapes too, is whether impacts would affect the integrity of a valued landscape."

6.7.59 The Landscape Institute (GLVIA 3, paragraphs 5.46-47) further advises as follows:

"An internationally, nationally or locally valued landscape does not automatically or by definition have high susceptibility to all types of change."

"It is possible for an internationally, nationally or locally important landscape to have relatively low susceptibility to change resulting from the particular type of development in question, by virtue of both the characteristics of the landscape and the nature of the proposal."

"The particular type of change or development proposed may not compromise the specific basis for the value attached to the landscape."

6.7.60 In summary, for the reasons set out in the following sections, there would be No Significant effects on the South Lewis, Harris and North Uist NSA.

South Lewis, Harris and North Uist NSA

6.7.61 The South Lewis, Harris and North Uist NSA is an extensive area which stretches from Valtos in the north to Loch Eport in the south, and covers the mountainous parts of southwest Lewis, all of Harris, the Sound of Harris and the northern part of North Uist which forms a backdrop to the sound and its islands. The eastern and western limits are across open sea, but the northern margin is defined by a line enclosing the western flank of Great Bernera, the eastern flank of Little Loch Roag and running south through the summits of the Caultrashals, Ascleit, Kearnaval, Beinn a'Mhuil, Beinn Mhor (572m), Gormol, and Uisenis and on to the headland of Gob Rubh'Uisenis on the Sound of Shiant. It is located approximately 18.6km southwest of the Proposed Development.

6.7.62 As a national landscape designation, the value of the NSA is assessed as High. The susceptibility of this landscape to change is considered to be High in terms of the underlying landscape character. Taking account of these factors, the overall sensitivity of the NSA is assessed as High.

6.7.63 The ZTV coverage of this area is very fragmented, extending to only approximately 13% of the NSA. It is mostly focussed in areas of higher ground and hill summits as illustrated by Viewpoint 23, which is representative of other locations, and demonstrates the limited visual effects from these locations.

6.7.64 The SNH Commissioned Report No. 374, *The Special Qualities of the National Scenic Areas*, 2010, sets out information on the special qualities of the NSA with reference to the landform, land use, settlement, authenticity and integrity, time depth, visual experience, emotional response, wildlife and cultural and historical associations.

[6] Siting and Design Wind Farms in the Landscape, Version 3a, Scottish Natural Heritage (2017).

6.7.65 **Table 6.11** sets out each of the special qualities identified in Report No. 374 and assesses Proposed Development against each of these.

Table 6.11 Assessment of the Proposed Development on the Special Qualities of the NSA

Special Qualities	Assessment
Overall Special Qualities of the NSA	
A rich variety of exceptional scenery; *"The different island landscapes of mountain, moorland, croftland, coast and sea here come together to create an area of exceptional scenery.* *The bold, rugged hills of South Lewis and Harris complement the islands in the Sound of Harris. These islands in turn appear an extension to the remarkable landscape of North Uist, where water and land are intricately interlocked.* *A rich scenic variety results from the juxtaposition of the different landscapes, both north to south and east to west. Sharp contrasts are encountered between hills and low-lying lands, between sandy and rocky shores, between peat bog and machair, between island and sea. Additional variety is introduced through the contrast between the settled, crofting landscapes and the uninhabited moorland beyond."*	The Proposed Development would have ***no effect*** on the variety of landscape features and physical juxtapositions between landscape features. Much of the interplay described is evident to the south of Lewis, Harris and North Uist where there would be no visibility of the Proposed Development. Where visible, the views would be limited from elevated areas / summits within the NSA where the Proposed Development would be visible to the north across flat, open moorland (outwith the NSA) and <u>not</u> to the south towards Harris and North Uist.
A great diversity of seascapes: *"The sea is rarely far away. The deeply indented coastline and the combination of rock and sand provides seascapes which are hugely varied.* *Some views of the sea are restricted by a narrow frame of rock or an enclosed beach or bay. Others show an interplay of land and water through an intricate arrangement of islands, promontories and bays. In some places there is such a confusion of sea and land that it is not clear whether it is the sea at all.* *In contrast, there are grand, open seascapes with islands providing a sense of ever-receding oceanic backdrops. There are panoramas over peninsulas, islands, islets and skerries to distant shores, or further afield to the Minch and the Isle of Skye. Westwards the expansiveness of the Atlantic Ocean is a constant reminder that this is the edge of Europe – reinforced by far distant St Kilda visible low on the horizon."*	The Proposed Development would have ***no effect*** on the coastline or on the interplay of land and water along the coast, or on views out of the NSA towards coastal features and distant islands. Where visible, the views would be limited from elevated areas / summits within the NSA where the Proposed Development would be viewed as an inland feature across flat, open moorland to the north.
Intervisibility: *"The intervisibility between landscapes – views to another landscape type – is an outstanding quality of this NSA. The eye is continually led to distant horizons.* *Views out from high vantage points are spectacular in terms of their extent and expansiveness – as on a clear day from The Clisham (799m), when views extend from Cape Wrath to the Cuillin and St Kilda.* *Even low vantage points can include intervisibility between different landscapes within the Long Island, adding to the rich visual variety."*	The Proposed Development would be visible from the highest point of the NSA, An Cliseam (Clisham) (Viewpoint 23 – **Figure 6.45a-c**) at a distance of over 31km, where it would be seen as a distant and minor feature across open, varied moorland to the north (***Moderate / Slight effect***) (not significant). Existing wind farms are already a feature in this part of the moorland landscape. The addition of the Proposed Development would not alter the visibility of other landscape types within the NSA and beyond.

Special Qualities	Assessment
The close interplay of the natural world, settlement and culture: *"The physical character and location of human activity has been determined by the natural world, with settlement sparse in a landscape where nature comes across as the dominant force. The greater part of the NSA's vast interior land mass is largely uninhabited moorland and bog, cnoc and lochan, and bare, ice-scoured mountain massif.* *Although the area has been long-populated, habitation has always been constrained to the fringes of this vast outer landscape of mountain, moor, rock, loch and ocean. Where development does occur it is small scale and located on the edges of the mountains or the sea. However, its general sparsity does mean that the eye is drawn to the distant view of croft or building."*	The Proposed Development would not be located within the NSA's landmass and therefore would have ***no effect*** on the uninhabited landscape. Where it would be visible in long distance views, it would be seen to the fore of, and towards the coastal settlement Stornoway, and in a location already influenced by man-made development, including existing wind farms. Viewpoint 23 (**Figure 6.45a-c)** illustrates the visibility of the Proposed Development as part of an expansive open moorland landscape amongst a cluster of existing wind farm developments in the distance.
The indivisible linkage of landscape and history: *"Throughout the isles, scenery and landscape is permeated by a sense of history. Human activity has left subtle, yet perceptible traces that give a strong sense of continuity and place.* *Sometimes, these traces are only obvious to the onlooker in terms of the varied texture that they add to the landform or vegetation – the feannagan beds (lazy beds) and old peat cuttings being prime examples. Elsewhere activity is more obvious as structures or features contributing to the scene – for example, crofts, dry stone brochs and duns, and the Bunavoneader whaling station."*	The Proposed Development would have ***very little effect*** (not significant) on the subtle varied texture of the landform, vegetation, structures or features contributing to the landscape scene within the NSA. It would be located outwith the NSA and in an area already influenced by man-made development. It would not detract from the strong sense of place and distinctiveness present in the key views from the NSA, in particular the southern views towards Harris and North Uist.
The very edge of Europe: *"The perception of remoteness is strong, the islands themselves being physically remote from the centre of Europe, and much of the NSA itself being remote from settlements and public roads.* *This marginality instigates a strong sense of identity, culture and social cohesiveness that in turn finds direct expression in the landscape."*	The Proposed Development would not be located within the NSA. Whilst it is located within an expanse of moorland, it is situated near the urban influence of Stornoway and other man-made development including existing turbines and therefore, the sense of remoteness is greatly diluted. The Proposed Development would have ***very little effect*** **(not significant)** and therefore not detract from the current levels of these perceptual aspects. Wind farm development is often experienced in association with landscapes that are reasonably remote, secluded and natural in terms of their perceptual characteristics.
The dominance of the weather: *"The ever-changing wind, cloud, sun and rain cause similar changes in the colour, pattern and visibility of the hills, coasts and sea. No two hours, let alone two days, are the same.* *Hebridean sounds add richly to the scene: the sound of the wind is a defining quality, and in coastal areas, the sound of waves is ever present – their loudness determined by the prevailing weather. The call of birds is a summer sound of the machair. Natural sounds tend to predominate due to the absence of traffic and other man-made noise."*	The Proposed Development would have ***no effect*** on the interplay between the weather and "*changes in the colour, pattern and visibility of the hills, coasts and sea*".
Relevant Location Specific Qualities	

Special Qualities	Assessment
The wild, mountainous character: *"Although not particularly high compared to other Scottish hills, those within South Lewis and Harris give the impression of considerable altitude. In many places their steep-sided slopes appear to plunge directly into the sea.* *From the north, the Uig Hills and Clisham, bold and rugged, rise abruptly from the undulating boggy moorland that forms the interior of Lewis. The impressive views are epitomised by that from the natural vantage point of Eitseal that heads Lewis's vast peatlands.* *The mountains stand still and silent with a distinct lack of movement, and the general absence of development lends a wild and remote character to this whole region of rocky hills, precipitous glens, remote lochs and rushing rivers."*	The Proposed Development would have **no effect** on the physical presence of the mountains or their character. Viewpoints 5 and 6 (Beinn Mholach and Eitseal) (**Figures 6.28-29**), both outwith the NSA, illustrate that the view towards the Proposed Development is to the east-northeast which is in the opposite direction to the North Harris Mountains (located to the west-southwest). The Proposed Development would therefore have a minimal influence on the perception of the mountains from these locations. From some locations in the north, visibility of the turbines would be seen in the context of the North Harris Mountains to the south, however, existing turbines and other man-made development are already evident on the skyline. The Proposed Development would therefore have very little effect on the perception of the mountains from these locations.
Deep sea lochs that penetrate the hills: *"Deep fjord-like sea lochs penetrate the hills of South Lewis and Harris. This lends the surprise of finding tidal water, apparently far inland. The narrow, steep-sided, uncompromising fjords contrast with the softer, more open sea lochs and the lochans found within the cnoc and lochan landscapes. They possess a wild, undeveloped air, with development, if present at all, restricted to the few flatter, sheltered areas of their rocky coastlines.* *These enclosed sea lochs embrace a surrounding stillness and tranquillity that is only disrupted by the natural forces of the wind and sea."*	The Proposed Development would have ***no effect*** on sea lochs – particularly those located within the NSA which tend to be in locations where there would be no theoretical visibility of the Proposed Development.
The narrow gorge of Glen Bhaltos: *"The route linking Loch Ròg and Uig through Glen Bhaltos, is remarkable and impressive. The road follows a narrow gorge, cutting off all distant views so that the surrounding enclosed landscape offers a completely different experience to that found elsewhere within the NSA."*	The ZTV indicates limited theoretical visibility of the Proposed Development from the gorge of Glen Bhaltos. Site visits and wireline analysis indicates that visibility of the Proposed Development would be unlikely at over 25km and would be screened by intervening built-form and / or vegetation at Uigen / Uigean (***no effect***).
Extensive machair and dune systems with expansive beaches: *"The western fringe of sand, dune and machair along the Harris coast, and at Uig in South Lewis, relieve what would otherwise be a stark, rocky landscape. The soft-gentle, slowly shelving coastline with its beaches contrasts markedly with the inland landscapes of rock, hill and mountain.* *The area's beautiful beaches – wide, sandy and machair-backed – are renowned. The clearness and purity of the water and sands are marked. The machair, created through an interplay of crofting and nature, is famous for its richness of wildflowers and breeding wildfowl and waders.* *There is a remarkable variety of different coastal lands. Extensive areas are made up of complexes of beaches, sand hills, dunes and machair and, in places, saltmarsh.* *The expansiveness of the beaches culminates with those at Horgabost, Seilebost, Corran and Losgantir that together form a large beach area where the curving finger-like, sand spit of Corran Seilebost leads out across Traigh Losgantir.* *In good weather, the bright clear colours appear iridescent against the darker inland hills and moors."*	The Proposed Development would have very limited effect on the Machair LCT within the Study Area as described in the table above. There would be ***no effect*** on areas of Machair and beaches along the Harris coast and at Uig in South Lewis.

6.7.66 There would be no significant landscape effects on landscape character within the South Lewis, Harris and North Uist NSA. As set out in **Table 6.11**, it is considered that the special qualities and integrity of the NSA would not be significantly affected, the magnitude of change would be Low-Negligible and the level of effect would be Moderate / Slight to Slight to None and not significant. The nature of these effects would be indirect, long-term (reversible), and negative to neutral.

Cumulative Assessment: Proposed Development + Existing + Consented Sites

6.7.67 With the exception of the existing Monan turbines (High to Zero magnitude), there are no existing or consented wind farms within the NSA. Those outwith the NSA are mainly located beyond 20km to the northeast and outwith its boundary (Negligible to Zero magnitude). The only exception is the consented Muaitheabhal wind farms which are located 2km northeast of the NSA boundary and would have the greatest effects on the NSA (Medium to Zero magnitude) within approximately 2km of the turbines. The combined magnitude of other wind farms on the special qualities of the NSA would be High to Zero.

6.7.68 The additional effect of the Proposed Development would not significantly affect the special qualities or integrity of the NSA (Low-Negligible magnitude) and would introduce a Moderate / Slight to Slight to Zero and not significant effect. The combined cumulative effect would be **Substantial to Substantial / Moderate** and **significant** (due to Monan and Muaitheabhal within 2km of the turbines and not the Proposed Development) to Zero and not significant. The nature of these effects would be long-term (reversible), cumulative, and negative to neutral.

6.8 Residual Visual Effects

6.8.1 Visual effects are assessed by considering the sensitivity of the receptor (people in the landscape) and the magnitude of change that would affect the view or overall visual amenity. They are defined by the Landscape Institute in GLVIA 3, paragraphs 6.2 as follows.

"An assessment of visual effects deals with the effects of change and development on the views available to people and their visual amenity. The concern here is with assessing how the surroundings of individuals or groups of people may be specifically affected by changes in the content and character of views as a result of the change or loss of existing elements of the landscape and/or introduction of new elements."

6.8.2 The type of effect may also be described as temporary or permanent, direct or indirect, cumulative and positive, neutral, or negative.

6.8.3 The assessment methodology is set out in **Appendix 6A** and the residual visual effects assessed are those remaining after the embedded design mitigation and enhancement measures (see **Table 6.8**) have been taken into account.

6.8.4 The visual assessment has been set out as follows:

- Overview of Visual Effects during Construction;
- Overview of Visual Effects during Operation;
- Overview of Visual Effects during Decommissioning;
- Visual Effects on Views from Settlements and Residential Properties;
- Visual Effects on Views from Transport Routes;
- Visual Effects on Views from Recreational Routes;

- Visual Effects on Views from Recreational and Tourist Destinations; and
- Visual Effects on Views of Anglers.

6.8.5 Visualisations of the Proposed Development are provided from 27 viewpoint locations and illustrated in **Figures 6.24** to **6.50**. Each viewpoint is assessed in a separate appendix (**Appendix 6B**).

6.8.6 The ZTV and viewpoint analysis (periods of both day and night) indicates that the assessment should be focused on a detailed Study Area of 15km from the Proposed Development. Taking a precautionary approach, and drawing from consultation advice and best practice guidance, the visual assessment has therefore focused on all local receptors (settlements, roads and local recreational routes) within 15km.

6.8.7 Some receptors within the wider 15-35km Study Area that are overlapped by the blade tip ZTV have been assessed, including receptors of regional or national importance such as Sustrans Cycle Routes, long distance footpaths and well-known tourist / recreational destinations.

Overview of Visual Effects during Construction

6.8.8 The majority of the significant visual effects would be experienced as a result of the proposed turbines during the operational period and this forms the main focus of the assessment. However, the visual effects associated with the construction phase of the Proposed Development and the infrastructure components also have the potential to be significant.

6.8.9 The layout of the Proposed Development is shown in **Figure 4.1**. Views of construction activity would include construction traffic at the site entrances as well as vehicle and crane movement and the erection of the turbines. Ground level construction activities at the temporary construction compounds, storage areas, substations and borrow pits would tend to be screened by landform or otherwise partially visible from more limited areas. Small areas of plantation forestry would be felled for the erection of up to eight turbines and parts of the access tracks. New areas of plantation forestry may be planted as a result of felling. This would be carried out in the areas identified in **Figure 9B.3** and in consultation with SNH. Where visible, the wind farm site tracks, infrastructure and areas of plantation forestry are illustrated in the visualisations for Viewpoints 1, 2, 3, 4, 5, 6, 7 and 25 presented in **Figures 6.24, 6.25, 6.26, 6.27, 6.28, 6.29, 6.30** and **6.47**.

6.8.10 In general terms, visual effects associated with the construction phase would increase from Zero prior to the start of construction, until they are at the same levels as those predicated for the operational effects once the turbines are erected. Each of the component parts of the Proposed Development have been assessed in **Table 6.12** in terms of the potential for residual visual effects where there may be some opportunity to view the component parts of the Proposed Development.

6.8.11 During the construction period, visibility of ground-based construction activity (which includes temporary compound and storage areas, substations and construction vehicles) would be present from parts of the A859, A858, Hebridean Way and Timeless Way. Beyond the Development Site, visibility of these features would mainly be limited to higher ground overlooking it as illustrated by Viewpoints 2: Lewis War Memorial (**Figure 6.25**), 4: Cnoc na Croich (Gallows Hill) (**Figure 6.27**), 5: Beinn Mholach (**Figure 6.28**) and 6: Eitseal (**Figure 6.29**). Part of the access tracks and new areas of plantation forestry would also be visible at approximately 5km from Viewpoints 1-7, and 25 and potentially from eastern end of Pentland Road, western edge of Newmarket, and residential properties at Macaulay Farm and Marybank (along the A859).

Table 6.12 Construction Effects (visual) of the Proposed Development Site Infrastructure

Proposed Development	Assessment
Wind Turbines	The visual effects related to the 35 turbines would lead to the greatest visual effects, ranging from Zero magnitude at the start of the construction period and increasing to operational levels at the end of the construction period. These effects have been assessed in more detail as part of the main visual assessment in this chapter and the viewpoint analysis (**Appendix 6B**). The viewpoint analysis concluded that the threshold for **significant** visual effects would extend out to locations approximately 14km from the nearest turbine, which is supported by the main assessment.
Construction Lighting	During the construction period, some limited health and safety lighting would be required at the site entrance office and temporary construction compounds and there would also be lights from vehicles moving around the site during periods of darkened daylight hours such as heavy rain / dark skies. Cranes may also carry aviation warning lights dependent upon their height and it has been assumed that up to two cranes would be present on site during the construction period. The visual effects of these lights would be **Substantial / Moderate** and **significant**, extending out to approximately 2km from the light sources within the Development Site area. The nature of these effects would be temporary, direct, cumulative and negative.
On-site Wind Farm Tracks and Water Crossings	Approximately 28.7km of wind farm track is required, including associated crane pads, laybys and turning areas. It is likely that with the exception of elevated vantage points (Viewpoint 2, 4, 5 and 6), only short sections of these tracks and water crossings would be visible to members of the public along the A859, A858, Hebridean Way and Timeless Way. Part of the access tracks would also be visible at approximately 5km from Viewpoints 1-7, and 25 and potentially from the eastern end of Pentland Road, western edge of Newmarket, and a small number of residential properties along the A859. The magnitude of change would range from High-Medium to Zero. There would be a **Substantial / Moderate to Moderate** and **significant** localised effect during construction. The nature of these effects would be permanent, direct and negative.
Main and Secondary Substations (including battery storage facilities)	The main and secondary substations would have low visibility from the surrounding areas and limited to small parts of the A858 and A859 (including a very small number of residential properties along the A859), as confirmed by site visits and ZTV analysis. The colour of the substations would be co-ordinated with the colour of surrounding moorland to have a low contrast, hence reducing magnitude of change. The development would be enclosed by a 2.7m high perimeter fence with a low visibility style and colour. There would be limited opportunities to view these components of the Proposed Development although they would be visible from elevated hill tops (Viewpoints 5 and 6) and the magnitude of change would be Low-Negligible to Zero such that the level of visual effect would be Slight to Slight / Negligible to No View and not significant, long term (reversible), direct, and negative.
Electrical Cables	All electrical cables would be routed underground, along wind farm track verges, the visual effect would be **Zero** and not significant. The nature of these landscape effects would be temporary, direct, and negative during construction; altering to neutral upon completion.
Temporary Construction Compound	Views may be available from a very short stretch of the A859, viewing beyond the existing pylons and telegraph poles, and from the A858 subject to localised landform and vegetation. The Temporary Construction Compound would also be from elevated hill tops (Viewpoints 5 and 6). The magnitude of change would be Low to Negligible or Zero and the level of effect Moderate / Slight or No View and not significant. The nature of these effects would be temporary, direct and negative, altering to neutral post restoration.
On-Site Borrow Pits	Up to five borrow pits are proposed within the Development Site as indicated on **Figures 4.12a-e**. One borrow pit would be located to the north of the A858 to the west of Cnoc nam Fiadh. There would be very limited visibility from public areas, including part of the A858 and Beinn Mholach to the northwest. The level of effect would be Moderate / Slight to No View and not significant and the nature of these effects would however be partly temporary (subject to permanent restoration) direct, and negative during the construction period.

Proposed Development	Assessment
	Up to four borrow pits would be located to the south of the A858. Visibility from public areas would be limited from small parts of the A858 and A859, elevated vantage points (Viewpoints 2, 4, 5 and 6) and a small number of properties along the A859 (High to Medium sensitivity). The borrow pits would be visible beyond telegraph poles / pylons located in the foreground of receptors' views (Medium to Zero magnitude). The level of effect would be **Substantial / Moderate to Moderate** and **significant** to No View and not significant. The nature of these effects would be partly temporary (subject to permanent restoration) direct, and negative during the construction period. It is anticipated that borrow pit restoration process would restore the character of the existing *Boggy Moorland* and blend the excavations into the surrounding natural topography, reducing the magnitude to Low and leading to Moderate / Slight to Slight residual visual effects, post restoration which would be not significant. These residual effects would however be permanent, direct, and neutral on completion. A further detailed assessment should be undertaken once more information including a restoration plan, is available in order to confirm the outline assessment and adjust the borrow pit design and restoration accordingly if required.
Plantation Forestry	Up to 41.4ha of plantation forestry would be lost as a result of the erection of up to eight turbines and parts of the access track, as set out in **Appendix 9J.** The visibility of the lost areas would be very limited from public areas including parts of the A858, and elevated vantage points (Viewpoints 5 and 6). The magnitude of change would be Low to Zero and the level of effect Moderate or No View and not significant. The nature of these effects would be permanent, direct and negative. To compensate for the loss of plantation forestry, new areas of plantation forestry could be planted within the 'Planned New Plantings' boundaries as illustrated on **Figure 9B.3** and are further illustrated in the visualisations for Viewpoints 1 – 7 and 25, where visible. The magnitude of change would range from High-Medium to Zero and the level of effect would be **Substantial / Moderate** and **significant** to No View and not significant. The nature of these effects would be permanent, direct and positive or neutral.

Overview of Visual Effects during Operation

6.8.12 The appearance of the Proposed Development would recover a 'calmer' visual character with very low levels of maintenance activity visible on site from the nearest visual receptors. It is during this period however, that the majority of significant visual effects would be experienced as a result of the proposed turbines.

Overview of Visual Effects during Decommissioning

6.8.13 During the decommissioning of the Proposed Development, the Development Site would return to being a 'construction site' for a temporary period, and the level of effect would be variable according to the phase and location of activity. The magnitude of change would eventually reduce to Negligible with the removal of the turbines and associated above ground infrastructure (including turbines, transformers and the main and secondary substations), thus rendering the visual effects of the Proposed Development as predominantly reversible.

6.8.14 Those parts of the Proposed Development remaining as permanently visible, above ground features within the landscape may include internal wind farm tracks (that may be used for farming and recreation access). In overall terms, the level of visual effects would reduce to non-significant levels (Low to Negligible magnitude). The nature of these effects would be permanent, direct, and neutral to negative when compared to the pre-existing landscape[7] of the local area, although the areas of new plantation forestry could be a positive or neutral addition.

[7] The decommissioning has been compared to the pre-existing landscape ie assuming no construction of the Consented Development.

Visual Effects on Views from Settlements and Residential Properties

6.8.15 Settlements, defined in the Outer Hebrides Local Development Plan, have been included in the assessment within 15km of the Proposed Development. The visual effects likely to be experienced from settlements include consideration of residential areas, the public realm and public open spaces within the settlement boundaries that would be frequented by people.

6.8.16 The assessment of visual effects on views from residential properties within approximately 2km is undertaken via a RVAA which considers one aspect of residential amenity and is detailed in **Appendix 6C**. The methodology for the RVAA accords with GLVIA 3, the Landscape Institute's Technical Guidance Note 2/19, *Residential Visual Amenity Assessment*, March 2019, and CnES's *Supplementary Guidance for Wind Energy Development*, November 2018.

6.8.17 The sensitivity of receptors (people) at settlements and residential properties has been assessed as High.

Visual Effects on Settlements within 15km

6.8.18 Settlements within 15km that are overlapped by the ZTV have been assessed and these are presented in **Table 6.13**.

Table 6.13 Visual Effects: Views from Settlements

Settlement	Assessment
Stornoway Core Settlement	Stornoway Core Settlement incorporates the historic centre of Stornoway and is located approximately 3.2km east of the nearest turbine at its closest point. Stornoway Core Settlement is of the greatest density of any other settlement on the Isle of Lewis, indicating that views (including outward views) from within the settlement are frequently foreshortened by surrounding built-form. Movement from people, vehicular traffic and ferries form part of the dynamic visual character of the area and, the colour and variety in the built environment form transient focal points. The theoretical visibility of the Proposed Development from the settlement is indicated in **Figure 6.20a** and the views are illustrated by Viewpoints 10 (**Figure 6.33a-f**), 26 (**Figure 6.48a-e**), A (**Figure 6E.1, Appendix 6E**) and B (**Figure 6E.2, Appendix 6E**). <u>Assessment: Proposed Development</u> Westerly views (towards the Proposed Development) are largely restricted by intervening mature tree cover and rising landform associated with Lews Castle and Lady Lever Park GDL as illustrated in Viewpoints A and B. ZTV coverage indicates varying extents of theoretical visibility across the settlement – the west, north and parts of the south would have the least visibility of up to 1-8 turbines or no visibility. Within these areas, views of the Proposed Development would be infrequent due to surrounding buildings, vegetation and landform and would be limited to upper portions / blade tips of turbines (Low to Zero magnitude). This would also be the case where greater theoretical visibility is indicated within the centre of the settlement. The greatest visibility of the Proposed Development would be from a very small number of locations in the east of the settlement, including parts of Plasterfield (Viewpoint 10) and Oliver's Brae (Viewpoint 26) which are located at a slightly higher elevation than the rest of the settlement. These areas contribute to approximately 6% area of the Core Settlement. The Proposed Development would be seen beyond the settlement and Lews Castle and Lady Lever Park GDL, though would appear in the context of other man-made development including houses, existing turbines, telegraph poles, chimney stacks and street lighting posts (High-Medium to Medium magnitude). Aviation warning lights would be most visible from eastern parts of the settlement in the context of other light sources associated with houses, street lighting, vehicles, masts and existing turbines (**significant**). The effect of the Proposed Development on views from Stornoway Core Settlement would range from **Substantial to Substantial / Moderate** and **significant** (from a very small number of locations in the east at Plasterfield and Oliver's Brae equating to 6% of the settlement) to Moderate to No View and not significant from the majority of the settlement. The nature of these effects would be long-term (reversible), indirect and negative to neutral. <u>Cumulative Assessment: Proposed Development + Existing + Consented Sites</u>

Settlement	Assessment
	The existing Beinn Ghrideag and Pentland Road Wind Farms would be visible in most views alongside the Proposed Development subject to screening by intervening built-form, vegetation and landform (both Medium-Low to Zero magnitude). The existing Arnish Moor and Creed turbines would be visible to the immediate south of the proposed turbines (both Low / Low-Negligible to Zero magnitude). Other existing and consented wind farms visible would be of Negligible magnitude due to intervening distance and potential screening by built-form, vegetation and / or landform. The cumulative magnitude of change of existing and consented wind farms would be Medium-Low to Zero. The additional and combined effects of the Proposed Development would remain **Substantial to Substantial / Moderate** and significant (due to the Proposed Development) to Moderate to No View and not significant. The nature of these effects would be long-term (reversible), cumulative, indirect and negative to neutral.
Greater Stornoway Main Settlement – North (Newmarket, Newvalley, Marybank, Maryhill)	Greater Stornoway Main Settlement (North) comprises a number of smaller settlements located to the north and west of the Core Settlement. The theoretical visibility of the Proposed Development from the settlement is indicated in **Figures 6.20b-c.** The assessment includes Newmarket, Newvalley, Maryhill and Marybank which are assessed individually below. **Newmarket** Assessment: Proposed Development The small settlement of Newmarket is located on rising landform to the north of the Abhainn Lacasdail, approximately 2.1km east of the Proposed Development at its closest point. It is the most northerly area of Greater Stornoway and has developed along several minor roads which extend out from the A857. The majority of the properties have their principal orientations north / south or northeast / southwest, except for those along the A857 which are orientated east / west. ZTV coverage indicates that there would be no visibility of the Proposed Development from the properties along the majority of the A857 with the exception of a small section to the south between the school and Benside where hubs and blades would be theoretically visible subject to localised screening from trees and surrounding buildings (Low to Zero magnitude). Properties along the minor roads (Bakers Road, Grianan and Rathad nam Beicearan) to the west of the A857 would have theoretical views of the proposed turbines, however, they would range from being direct to very oblique from their principal elevations (High to Zero magnitude). Viewpoint 25 (**Figure 6.47a-h**) and residential group G (**Figure 6C.13, Appendix 6C**) illustrates visibility of the Proposed Development from the western parts of Newmarket (west of the A857). To the east of the A857, ZTV coverage indicates that some properties along the B895 would have theoretical visibility of up to 1-8 turbines. These properties are orientated to the southeast / northwest, away from the Proposed Development, and would have very limited views from their house or garden subject to further screening by intervening vegetation and / or built-form (Negligible to Zero magnitude). Similarly, properties along Newmarket Road are generally orientated north / south, away from the Proposed Development and views from their gardens are likely to be partially screened by intervening vegetation and / or built-form (Low-Negligible to Zero magnitude). Aviation warning lights would be most visible from western parts of Newmarket (Bakers Road, Grianan and Rathad nam Beicearan), west of the A857 with more limited visibility from parts of the B895 and Newmarket Road, and almost no visibility from the A857, and would be visible in the context of other light sources from houses, street lighting, vehicles, masts and existing turbines (**significant**). The effect of the Proposed Development on views from Newmarket would range from **Substantial** and **significant** (from western parts of Newmarket (Bakers Road, Grianan and Rathad nam Beicearan), west of the A857) to Slight to No View and not significant from the remainder of the settlement along the A857, Newmarket Road, Benside and B895. The nature of these effects would be long-term (reversible), indirect and negative to neutral. Cumulative Assessment: Proposed Development + Existing + Consented Sites The existing and consented wind farms visible from parts of this settlement would range from Low to Zero magnitude. The additional and combined effect of the Proposed Development would remain **Substantial** and **significant** (due to the Proposed Development) to Slight to No View and not significant. The nature of these effects would be long-term (reversible), cumulative, indirect and negative to neutral. **Newvalley** Assessment: Proposed Development The small settlement of Newvalley is located to the south of the Abhainn Lacasdail, east of the Proposed Development at approximately 2.1km at its closest point. It comprises two minor roads (Laxdale Lane / New Valley Road and Laxdale Road) on either side of a small valley with a connector road between the two roads. Properties at Guershader / Laxdale to the southeast are also included in this assessment.

Settlement	Assessment
	The majority of the properties are orientated southeast / northwest and would have oblique views of the Proposed Development, where visible. ZTV coverage indicates varying extents of theoretical visibility across Newvalley with all turbines visible from very limited areas at the western end of the settlement along New Valley Road and at Cnoc Mor on Laxdale Road. The remainder of the settlement would have theoretical visibility of up to 26 turbines. The greatest visibility of the Proposed Development would be from west of the connector road (including western parts of New Valley and Laxdale Roads) (High / High-Medium to Zero magnitude). Viewpoint 24 (**Figure 6.46a-e**) and residential groups D and F (**Figures 6C.8 and 6C.10, Appendix 6C**) illustrate visibility of the Proposed Development from the western and northern parts of the Newvalley. The visibility east of the connector road (eastern parts of New Valley and Laxdale Roads and in Guershader / Laxdale) would be limited due to screening effects of intervening vegetation, landform and / or built-form (Low-Negligible to Zero magnitude). Aviation warning lights would be visible from parts of the settlement in the context of other light sources from houses, street lighting, vehicles, masts and existing turbines (**significant**). The effect of the Proposed Development on views from Newvalley would range from **Substantial to Substantial / Moderate** and **significant** (western parts of New Valley and Laxdale Roads, and as indicated in Viewpoint 24) to Slight to No View and not significant (eastern parts of New Valley and Laxdale Roads and in Guershader / Laxdale). The nature of these effects would be long-term (reversible), indirect and negative to neutral. <u>Cumulative Assessment: Proposed Development + Existing + Consented Sites</u> The existing and consented wind farms visible from parts of this settlement would range from Low to Zero magnitude. The additional and combined effects of the Proposed Development would remain **Substantial to Substantial / Moderate** and **significant** (due to the Proposed Development) to Slight to No View and not significant. The nature of these effects would be long-term (reversible), cumulative, indirect and negative to neutral. **Maryhill** <u>Assessment: Proposed Development</u> The small settlement of Maryhill is located to the east of Loc Airigh na Lic, approximately 2.1km east of the Proposed Development at its closest point. Bennadrove Road is the only road through the settlement with properties flanked on either side of it. Properties to the north of Bennadrove Road are located at a lower elevation with limited views to the south and west than properties to the south of the road, however, landform rises to the southwest limiting views in this direction. ZTV coverage indicates theoretical visibility of all turbines in a very limited area to the west of the settlement (up to three properties). Views from this edge of the settlement are illustrated in residential group E (**Figure 6C.9, Appendix 6C**) (High magnitude). Visibility from the remainder of the settlement would be very limited due to screening by intervening landform, built-form and / or vegetation (Low to Zero magnitude). Aviation warning lights would be most visible from the western edge of the settlement in the context of other light sources associated from houses, masts and existing turbines (**significant**). The effect of the Proposed Development on views from Maryhill would range from **Substantial** and **significant** (from the three properties on the western edge of the settlement) to Slight to No View and not significant from the majority of the settlement. The nature of these effects would be long-term (reversible), indirect and negative to neutral. <u>Cumulative Assessment: Proposed Development + Existing + Consented Sites</u> The existing Beinn Ghrideag Wind Farm would be theoretically visible alongside the Proposed Development (Medium-Low to Zero magnitude). The additional and combined effects of the Proposed Development would remain **Substantial** and **significant** (due to the Proposed Development) to Slight to No View and not significant. The nature of these effects would be long-term (reversible), cumulative, indirect and negative to neutral. **Marybank:** <u>Assessment: Proposed Development</u> The small settlement of Marybank is located to the east of Loc Airigh na Lic along the A858 and also comprises properties along the A859 between Bennadrove Road and Creed Bridge. The settlement is located to the east of the Proposed Development at approximately 1.8km at its closest point. ZTV coverage indicates theoretical visibility of all turbines from the majority of the settlement, however, the visibility reduces considerably at the western edge (closest point to the Proposed Development) due to intervening landform. The majority of the properties along the A858 are orientated north / south and would have oblique views of the Proposed Development from their principal elevations, however, there would be more open views from their gardens and along the A858, subject to further screening by intervening built-form, vegetation and / or landform.

Settlement	Assessment
	The Proposed Development would be visible at hub height with some partial towers visible, as illustrated in residential group A (**Figures 6C.2-5, Appendix 6C**) (High / High-Medium magnitude). Visibility from properties along the A859 are more likely to be partially or fully screened by intervening landform, vegetation and / or built-form (High to Zero magnitude). Views of the Proposed Development would be seen in the context of other man-made development including telegraph poles, built-form, masts and existing turbines. Aviation warning lights would be most visible from parts of the settlement as described above in the context of other light sources from houses, street lighting, masts and existing turbines (**significant**). The effect of the Proposed Development on views from Marybank would range from **Substantial to Substantial / Moderate** and **significant** to No View and not significant. The nature of these effects would be long-term (reversible), indirect and negative to neutral. <u>Cumulative Assessment: Proposed Development + Existing + Consented Sites</u> The existing and consented wind farms visible from parts of this settlement would range from Low to Zero magnitude. The additional and combined effect of the Proposed Development would remain **Substantial to Substantial / Moderate** and **significant** (due to the Proposed Development) to No View and not significant. The nature of these effects would be long-term (reversible), cumulative, indirect and negative to neutral.
Liurbost, Crosbost and Ranais	Liurbost, Crosbost and Ranais are three small, linear settlements located to the south / southeast of the Proposed Development and the theoretical visibility of it from these is indicated in **Figure 6.19**. **Liurbost and Crosbost** <u>Assessment: Proposed Development</u> Liurbost and Crosbost are low-lying, linear settlements located along a minor road, between approximately 3.3 and 6.3km from the Proposed Development at their closest point. A small number of properties associated with Liurbost are located at the A859 junction. The majority of properties are orientated north / south with some orientated east / west. ZTV coverage indicates limited theoretical visibility of the Proposed Development from both settlements due to screening by intervening landform which rises to the north. Built-form and garden vegetation would limit further visibility. Where visible, views of the turbines would be largely limited to blades and blade tips (and a very small number of hubs). For the properties at the A859 junction, large industrial buildings, along with landform, limit views of the Proposed Development (Negligible magnitude). There would be very limited visibility of aviation warning lights from both settlements (not significant). The effect of the Proposed Development on Liurbost and Crosbost would range from Slight to No View and not significant. The nature of these effects would be long-term (reversible), indirect and negative to neutral. <u>Cumulative Assessment: Proposed Development + Existing + Consented Sites</u> The existing and consented wind farms visible from parts of this settlement would range from Negligible to Zero magnitude. The additional and combined effects of the Proposed Development would be Slight to No View and not significant. The nature of these effects would be long-term (reversible), cumulative, indirect and negative to neutral. **Ranais** <u>Assessment: Proposed Development</u> Ranais is a small, linear settlement located approximately 6.5km south / southeast of the Proposed Development at its closest point. The majority of the settlement is low-lying with a small number of properties located at a higher elevation in the middle and east of the settlement. The majority of the properties are oriented north / south, viewing across Loch Griomsiadair. The theoretical visibility of the Proposed Development is indicated in **Figure 6.19** and illustrated by Viewpoint 11 (**Figure 6.34a-e**). ZTV coverage varies widely across the settlement with the greatest visibility from the centre and east of the settlement coinciding with the slightly higher elevation. From these locations, the turbines would be partially visible beyond intervening landform and the loch (Medium magnitude) and would be visible in the context of other man-made development as illustrated in Viewpoint 11. Aviation warning lights would be visible from parts of the settlement in the context of other light sources from houses and existing turbines, as illustrated by Viewpoint N11 (**Figure 6D.8, Appendix 6D**). The effect of the Proposed Development would range from **Substantial / Moderate** and **significant** (from the centre and east of the settlement) to No View and not significant. The nature of these effects would be long-term (reversible), indirect and negative to neutral.

Settlement	Assessment
	Cumulative Assessment: Proposed Development + Existing + Consented Sites The existing and consented wind farms visible from parts of this settlement would range from Low to Zero magnitude. The additional and combined effects of the Proposed Development would remain **Substantial / Moderate** and **significant** (due to the Proposed Development) to No View and not significant. The nature of these effects would be long-term (reversible), cumulative, indirect and negative to neutral.
Tong (Tunga) (including Aird Tong (Aird Thunga))	Tong (including Aird Tong) is a small settlement located approximately 5.3km northeast of the Proposed Development at its closest point. The theoretical visibility of the Proposed Development from the settlement is indicated in **Figure 6.19** and the views are illustrated by Viewpoint 9 (**Figure 6.32a-e**). Assessment: Proposed Development The majority of Tong (and all of Aird Tong) is located to the east of the B895 with the primary views from properties out towards Broad Bay and the south. A small number of properties are located to the west of the B895 with their principal orientations southwest / northeast, towards the settlement of Stornoway. ZTV coverage indicates theoretical visibility of the turbines from all of the settlement, however, the main areas of visibility are from the west of the settlement where the turbines would be visible in open views beyond intervening landform and Stornoway, and in the context of other man-made development as illustrated by Viewpoint 9 (High-Medium magnitude). From the remainder of the settlement (east of the B895), visibility of the turbines would be more limited due to screening by intervening built-form, vegetation and landform, and the majority of these properties have their principal elevations towards Broad Bay, away from the Proposed Development (Low to Zero magnitude). Aviation warning lights would be most visible from western parts of the settlement in the context of other light sources from houses, existing turbines, masts and street lighting, as illustrated in Viewpoint N9 (**Figure 6D.7, Appendix 6D**) (not significant). The effect of the Proposed Development would range from **Substantial to Substantial / Moderate** and **significant** (from the west of the settlement, west of the B895) to Moderate to No View and not significant (from the remainder of the settlement). The nature of these effects would be long-term (reversible), indirect and negative to neutral. Cumulative Assessment: Proposed Development + Existing + Consented Sites The existing and consented wind farms visible from parts of this settlement would range from Low to Zero magnitude. The additional and combined effects of the Proposed Development would remain **Substantial to Substantial / Moderate** and **significant** (due to the Proposed Development) to Moderate to No View and not significant. The nature of these effects would be long-term (reversible), cumulative, indirect and negative to neutral.
Grimshader (Griomsidar) (including Ceann Hurnavay)	Grimshader is a small, linear settlement located approximately 4.7km southeast of the Proposed Development at its closest point. The theoretical visibility of the Proposed Development from the settlement is indicated in **Figure 6.19**. Assessment: Proposed Development The properties within the settlement are generally single storey and arranged in a low-density scattered layout, along a minor road, with little in the way of garden vegetation. The properties are orientated north / south or southeast / northwest with some properties viewing across Loch Griomsiadair, however, rising landform to the north restricts visibility of the Proposed Development. The underlying landform within the settlement varies widely, indicating that some properties are situated atop slight rises / vantage points. From these properties, there would be partial views of the proposed turbines (limited to blades and blade tips), in the context of other man-made development (Low to Low-Negligible magnitude). There would be very limited visibility of aviation warning lights from the settlement (not significant). The effect of the Proposed Development on Grimshader would range from Moderate to Moderate / Slight to No View and not significant. The nature of these effects would be long-term (reversible), indirect and negative to neutral. Cumulative Assessment: Proposed Development + Existing + Consented Sites The existing and consented wind farms visible from parts of this settlement would range from Low to Zero magnitude. The additional and combined effects of the Proposed Development would remain Moderate to Moderate / Slight to No View and not significant. The nature of these effects would be long-term (reversible), cumulative, indirect and negative to neutral.

Settlement	Assessment
Greater Stornoway Main Settlement – East (including Steinis, Sanndabhaig, Park End), Tolm and Mealabost)	Greater Stornoway Main Settlement (East) comprises a number of smaller settlements located to the southeast of the Core Settlement at approximately 5.6km from the Proposed Development at its closest point. The theoretical visibility of the Proposed Development from the settlement is indicated in **Figure 6.20b.** The assessment includes the settlements of Steinis, Sanndabhaig, Lower Sandwick and Park End. The small settlements of Tolm and Mealabost located to the east of Greater Stornoway are also included in this assessment. Assessment: Proposed Development This is a low-density residential area comprising one and two storey properties mostly orientated west / east or northeast / southwest with some properties facing towards the Proposed Development. The primary view from several of these properties is towards Cala Steornabahigh. There would be theoretical visibility of the Proposed Development from a number of west facing properties, particularly in Lower Sandwick, Sanndabhaig and Mealabost albeit views would be limited by surrounding built-form in some cases (particularly within Park End and to a lesser extent, Steinis) (High-Medium to Zero magnitude). Existing turbines and other man-made development (chimney stacks, industrial units) would also be visible in these views. Aviation warning lights would be most visible from parts of Steinis, Sanndabhaig, Lower Sandwick and Mealabost (and less so from Park End and Tolm) in the context of other light sources from houses, industrial units, street lighting, masts, airport / runway lighting and existing turbines (**significant**). The effect of the Proposed Development would range from **Substantial to Substantial / Moderate** and **significant** (from parts of Steinis, Sanndabhaig, Lower Sandwick and Mealabost) to Slight to No View and not significant (from Tolm and Park End). The nature of these effects would be long-term (reversible), indirect and negative to neutral. Cumulative Assessment: Proposed Development + Existing + Consented Sites The existing and consented wind farms visible from parts of this settlement would range from Low to Zero magnitude. The additional and combined effects of the Proposed Development would remain **Substantial to Substantial / Moderate** and **significant** (due to the Proposed Development) to Slight to No View and not significant. The nature of these effects would be long-term (reversible), cumulative, indirect and negative to neutral.
Coll (Col) (including Col Uarach, Cnoc an t-Solais, Back and Griais)	Coll is a small, low-density settlement located approximately 7.5km northeast of the Proposed Development at its closest point. The assessment includes the settlements of Coll, Col Uarach, Breivig, Back and Gress. The theoretical visibility of the Proposed Development from Coll is indicated in **Figure 6.19** and the views are illustrated by Viewpoint 12 (**Figure 6.35a-e**). Assessment: Proposed Development The majority of properties in Coll, Col Uarach and Back are orientated northeast / southwest whilst most of the properties in Breivig and Gress are oriented north / south, overlooking Broad Bay and the Eye Peninsula. The majority of Back is surrounded by rising landform to the southwest and northeast. ZTV coverage indicates theoretical visibility of the Proposed Development from the majority of Coll, Col Uarach, Gress and Breivig, with the majority of Back located outwith the ZTV. Visibility of the turbines would vary due to screening by built-form and vegetation. However, where visible, the turbines would appear in wide, open views, beyond intervening landform and the settlements of Tung and Stornoway and in the context of other man-made development as illustrated by Viewpoint 12 (Medium-Low magnitude). Further screening by built-form and vegetation within the settlements would reduce visibility of the turbines (Low to Zero magnitude). Aviation warning lights would be most visible from parts of the settlements (except Back which would have no visibility) in the context of other light sources from houses, existing turbines, masts and street lighting (not significant). The effect of the Proposed Development would range from **Substantial / Moderate to Moderate** and **significant** (from parts of Coll and Col Uarach) to Moderate / Slight to No View and not significant (from remainder of Coll and Col Uarach and all of Back, Gress and Breivig). The nature of these effects would be long-term (reversible), indirect and negative to neutral. Cumulative Assessment: Proposed Development + Existing + Consented Sites The existing and consented wind farms visible from parts of this settlement would range from Low to Zero magnitude. The additional and combined effects of the Proposed Development would remain **Substantial / Moderate to Moderate** and **significant** (due to the Proposed Development) to Moderate / Slight to No View and not significant. The nature of these effects would be long-term (reversible), cumulative, indirect and negative to neutral.

Settlement	Assessment
Cromore (Cromor)	Cromore is a small, linear settlement located approximately 9.7km distance, southeast of the Proposed Development at its closest point. The theoretical visibility of the Proposed Development from the settlement is indicated in **Figure 6.19**. Assessment: Proposed Development The properties are orientated east / west or north / south with the majority viewing across Loch Thorasdaidh and Loch Eierasort. There would be open views across the water from some properties located to the north and those at a slightly higher elevation, and the minor road, where the upper parts of the turbines would be visible in the context of other existing turbines, in particular, Arnish Moor (Low to Zero magnitude). Aviation warning lights would be limited from the northern and elevated parts of the settlement in the context of other light sources including existing turbines, street lighting and houses (not significant). The effect of the Proposed Development on Cromore would range from Moderate to No View and not significant. The effect would not be significant due to a number of factors including screening by intervening landform, large-scale of the landscape, presence of other vertical elements and distance from the settlement. The nature of these effects would be long-term (reversible), indirect and negative to neutral. Cumulative Assessment: Proposed Development + Existing + Consented Sites The existing and consented wind farms visible from parts of this settlement would range from Low to Zero magnitude. The additional and combined effects of the Proposed Development would remain Moderate to No View and not significant. The nature of these effects would be long-term (reversible), cumulative, indirect and negative to neutral.
Knock (An Cnoc) (including Suardail and Aiginis) (on the Eye Peninsula / An Rubha)	Knock is a small, low-density settlement (including Suradail and Aignish), located on the Eye Peninsula, approximately 10km east of the Proposed Development at its closest point. The theoretical visibility of the Proposed Development from the settlement is indicated in **Figure 6.19** and the view is illustrated by Viewpoint 14 (**Figure 6.37a-e**). Assessment: Proposed Development The majority of properties are orientated east / west with open, elevated views to the west, although gently undulating landform and the waterbodies in the views towards the Proposed Development heightens the sense of distance in this direction. ZTV coverage indicates theoretical visibility from the majority of the settlement, however, built-form and vegetation would limit further visibility from some properties. Where views are available, the turbines would be wholly or partially visible in wide, open views, beyond intervening landform and the settlement of Stornoway, and would appear in the context of other man-made development as illustrated in Viewpoint 14 (Medium magnitude). Aviation warning lights would be visible from parts of the settlement in the context of other light sources from houses, existing turbines, masts and street lighting, as illustrated by Viewpoint N14 (**Figure 6D.9, Appendix 6D**) (**significant**). The effect of the Proposed Development on Knock would range from **Substantial / Moderate** and **significant** to No View and not significant. The nature of these effects would be long-term (reversible), indirect and negative to neutral. Cumulative Assessment: Proposed Development + Existing + Consented Sites The existing and consented wind farms visible from parts of this settlement would range from Low to Zero magnitude. The additional and combined effects of the Proposed Development would remain **Substantial / Moderate** and significant (due to the Proposed Development) to No View and not significant. The nature of these effects would be long-term (reversible), cumulative, indirect and negative to neutral.
Gearraidh Bhaird (Garyvard), Kershader and Tabost	These linear settlements are located along the B8060, approximately 10.6km south of the Proposed Development at their closest point, viewing across Loch Eireasort. The theoretical visibility of the Proposed Development from the settlements is indicated in **Figure 6.19** and the views from Gerraidh Bhaird is illustrated by Viewpoint 15 (**Figure 6.38a-e**). **Gerraidh Bhaird (Garyvard)** Assessment: Proposed Development The settlement of Gearraidh Bhaird comprises well-spaced, low density properties (with varied orientation) that are scattered across a rolling, rocky landform, viewing across Loch Eireasort. Some properties have an open, elevated aspect to the north with more open views towards the Proposed Development. ZTV coverage within the settlement is varied with the greatest visibility in the centre of the settlement where the turbines would be partially visible (upper parts of the turbine towers, hubs and blades) beyond the loch and intervening landform, in wide, open views and in the context of other man-made development as illustrated in Viewpoint 15 (Medium-Low magnitude).

Settlement	Assessment
	Aviation warning lights would be most visible from the centre of the settlement (not significant). The effect of the Proposed Development on Garyvard would range from **Substantial / Moderate** and **significant** to Moderate to No View and not significant. The nature of these effects would be long-term (reversible), indirect and negative to neutral. Cumulative Assessment: Proposed Development + Existing + Consented Sites The existing wind farms visible from parts of this settlement would range from Low to Zero magnitude. The consented Muaitheabhal wind farms would be visible to the south from elevated areas of the settlement at approximately 6km (Medium to Low magnitude). The additional effect of the Proposed Development would remain **Substantial / Moderate** and **significant** to Moderate to No View and not significant. The combined effect would be **Substantial / Moderate to Moderate** and **significant** (due to Muaitheabhal and the Proposed Development) to No View and not significant. The nature of these effects would be long-term (reversible), cumulative, indirect and negative to neutral. **Kershader and Tabost** Assessment: Proposed Development The linear settlements of Kershader and Tabost comprise well-spaced, low density properties (with varied orientation) that are scattered across a rolling, rocky landform, viewing across Loch Eireasort. They are located further west and are at a lower elevation than Garyvard. ZTV coverage within the settlements is limited due to the rising landform, north of Loch Eireasort. Where visible, views of the Proposed Development would be limited to blades and blade tips (Low / Low-Negligible to Zero magnitude). Aviation warning lights would be limited from parts of the settlements (not significant). The effect of the Proposed Development on Kershader and Talbost would range from Moderate to Moderate / Slight to No View and not significant. The nature of these effects would be long-term (reversible), indirect and negative to neutral. Cumulative Assessment: Proposed Development + Existing + Consented Sites The existing wind farms visible from parts of this settlement would range from Low-Negligible to Zero magnitude. The consented Muaitheabhal wind farms would be visible to the south at approximately 6km from parts of the settlements (Medium to Low magnitude). The additional effect of the Proposed Development would remain Moderate to Moderate / Slight to No View and not significant. The combined effect would be **Substantial / Moderate** and significant (due to Muaitheabhal) to No View and not significant. The nature of these effects would be long-term (reversible), cumulative, indirect and negative to neutral.
Garrabost / Upper Garrabost (on the Eye Peninsula / An Rubha)	Garrabost is a small, linear settlement on the Eye Peninsula, located approximately 11.6km east of the Proposed Development at its closest point. The theoretical visibility of the Proposed Development from the settlement is indicated in **Figure 6.19.** Assessment: Proposed Development The main settlement (Garrabost) is located along the A866 with properties orientated northwest / southeast at a slightly lower elevation whilst Upper Garrabost is located to the west / northwest at a slightly higher elevation with properties orientated southwest / northeast. ZTV coverage across the settlement is varied with all turbines theoretically visible from Upper Garrabost with fragmented visibility within Garrabost itself. Views from Garrabost would be oblique and restricted to blade tips due to intervening landform (Low-Negligible to Zero magnitude). Views from Upper Garrabost would be more open with the turbines either wholly or partially visible beyond the settlement of Stornoway, intervening landform and vegetation and in the context of other man-made development. The magnitude of change on Upper Garrabost would range from Medium / Medium-Low to Zero magnitude. Aviation warning lights would be visible, mainly from Upper Garrabost in the context of other light sources from houses, existing turbines, masts and street lighting (not significant). The effect of the Proposed Development would range from **Substantial / Moderate to Moderate** (Upper Garrabost) and **significant** to Slight to No View and not significant (Garrabost). The nature of these effects would be long-term (reversible), indirect and negative to neutral. Cumulative Assessment: Proposed Development + Existing + Consented Sites The existing and consented wind farms visible from parts of this settlement would range from Low to Zero magnitude. The additional and combined effects of the Proposed Development would remain **Substantial / Moderate to Moderate** and **significant** (due to the Proposed Development) (Upper Garrabost) to Slight to No View and not significant (Garrabost). The nature of these effects would be long-term (reversible), cumulative, indirect and negative to neutral.

Settlement	Assessment
Marvig (Marbhig)	Marvig is a small settlement located on the eastern coastline of the Isle of Lewis, overlooking Loch Mharabhig, approximately 12km southeast of the Proposed Development at its closest point. The theoretical visibility of the Proposed Development from the settlement is indicated in **Figure 6.19**. Assessment: Proposed Development Marvig is located across undulating landform, with several properties located at a lower elevation towards the loch, and some properties located at a slightly higher elevation in the south of the settlement. The majority of the properties are orientated north / south with views of the loch, whilst the properties at a higher elevation have more open views, however, still confined by landform. The landform in this settlement is very rocky and undulating and this is reflected in the ZTV coverage which indicates the greatest theoretical visibility from the more elevated areas in the south of the settlement. Northerly views (towards the Proposed Development) are generally cut short for low-lying properties by rising landform across Loch Mharabhig and would be limited to blades and blade tips (Low-Negligible to Zero magnitude). In more elevated areas to the south, views of the turbines would be partially screened by the landform and limited to upper parts of the towers, hubs and blades (Low to Zero magnitude), where visible. Aviation warning lights would be limited to more southern parts of the settlement for properties located at a higher elevation and visible in the context of other light sources associated with houses, street lighting and existing turbines (not significant). The effect of the Proposed Development on Marvig would range from Moderate to No View and not significant. The effect would not be significant due to screening by intervening landform, large-scale of the landscape, presence of other vertical elements and distance from the settlement. The nature of these effects would be long-term (reversible), indirect and negative to neutral. Cumulative Assessment: Proposed Development + Existing + Consented Sites The existing and consented wind farms visible from parts of this settlement would range from Negligible to Zero magnitude. The additional and combined effects of the Proposed Development would remain Moderate to No View and not significant. The nature of these effects would be long-term (reversible), cumulative, indirect and negative to neutral.
Lower Bayble (Pabail Iarach) and Upper Bayble (Pabail Uarach) (on the Eye Peninsula / An Rubha)	Lower and Upper Bayble are two small settlements on the Eye Peninsula, located approximately 13km east of the Proposed Development at its closest point. The theoretical visibility of the Proposed Development from both settlements is indicated in **Figure 6.19**. Assessment: Proposed Development The properties in Lower Bayble are situated at a lower elevation and have no visibility of the Proposed Development due to the rising landform, as indicated by the ZTV (Negligible to Zero magnitude). The properties in Upper Bayble are situated at a slightly higher elevation and are orientated north / south or northeast / southwest with their primary views over Bagh Phabail and The Minch. ZTV coverage for Upper Bayble indicates theoretical visibility from much of the settlement, however, there would be partial visibility of the proposed turbines above the rising landform over Lower Bayble to the west, albeit the majority of properties are orientated towards the south (over Bagh Phabail and The Minch) and views would therefore be oblique. Views from Upper Bayble would be limited to blades and blade tips with some hubs from parts of the settlement due to the rising landform and built-form of the settlement of Knock to the west on the horizon. The magnitude of change would range from Low to Zero. There would be limited visibility of the aviation warning lights from Upper Bayble and almost no visibility of the lights from Lower Bayble (not significant). The effect of the Proposed Development would be Moderate to No View and not significant (Upper Bayble) and Slight to No View and not significant (Lower Bayble). The effect would not be significant due to screening by intervening landform, large-scale of the landscape, presence of other vertical elements and distance from the settlements. The nature of these effects would be long-term (reversible), indirect and negative to neutral. Cumulative Assessment: Proposed Development + Existing + Consented Sites The existing and consented wind farms visible from parts of the settlements would range from Negligible to Zero magnitude. The additional and combined effects of the Proposed Development would remain Moderate to No View and not significant (Upper Bayble) and Slight to No View and not significant (Lower Bayble). The nature of these effects would be long-term (reversible), cumulative, indirect and negative to neutral.

Settlement	Assessment
Barvas (Barabhas)	Barvas is a small, linear settlement, located approximately 12.8km north of the Proposed Development at its closest point. It comprises Lower Barvas, Barvas and Upper Barvas. The theoretical visibility of the Proposed Development from the settlement is indicated in **Figure 6.19** and is illustrated by Viewpoint 21 **(Figure 6.43a-e)**, located to the north of the settlement. Assessment: Proposed Development The majority of Lower Barvas is outwith the ZTV and would have very limited or no visibility of the Proposed Development (Negligible to Zero magnitude). ZTV coverage indicates theoretical visibility of up to 17 turbines from Barvas and up to 26 turbines from Upper Barvas. The majority of the properties are orientated northwest / southeast and views towards the turbines would be oblique. The Proposed Development would be visible as hubs and blades at the northern end of Upper Barvas (Low to Zero magnitude) reducing to blades and blade tips at Barvas (Low-Negligible to Zero magnitude). Aviation warning lights would be limited to parts of Upper Barvas (not significant). The effect of the Proposed Development would range from Moderate to No View and not significant (Upper Barvas) and Slight to No View and not significant (Barvas and Lower Barvas). The effect would not be significant due screening by intervening landform, large-scale of the landscape, and distance from the settlement. The nature of these effects would be long-term (reversible), indirect and negative to neutral. Cumulative Assessment: Proposed Development + Existing + Consented Sites The existing Baile an Truiseil turbines would be visible to the north of the settlement, primarily from Upper Barvas (High magnitude). Other existing and consented wind farms visible from parts of this settlement would range from Negligible to Zero magnitude. The additional effect of the Proposed Development would remain Moderate to No View and not significant (Upper Barvas) and Slight to No View and not significant (Barvas and Lower Barvas). The combined effect would be **Substantial** and **significant** (Upper Barvas) (due to Baile an Trusieil) to Slight to No View and not significant (Barvas and Lower Barvas). The nature of these effects would be long-term (reversible), cumulative, indirect and negative to neutral.
Shulishader (Sulaisaidar) (on the Eye Peninsula / An Rubha)	Shulishader is a small, linear settlement along the A866 on the Eye Peninsula, located approximately 14km east of the Proposed Development at its closest point. The theoretical visibility of the Proposed Development from the settlement is indicated in **Figure 6.19** and is illustrated by Viewpoint 18 **(Figure 6.41a-e)**. Assessment: Proposed Development The majority of properties are aligned with the road (facing northwest to southeast) with a small number of properties orientated west / east. Westerly views are foreshortened in places by intervening landform. ZTV coverage indicates theoretical visibility of all turbines from much of the settlement, however, due to the alignment and orientation of built-form within the settlement, the greatest visibility would be from the west of the settlement, as illustrated by Viewpoint 18. A small number of properties would view the turbines beyond intervening landform and settlement in the context of other man-made development (Medium-Low magnitude). Visibility of the Proposed Development from the centre and east of the settlement would be limited due to screening by intervening built-form, vegetation and / or landform (Low-Negligible to Zero magnitude). Aviation warning lights would be most visible from the west of the settlement and in the context of other light sources from houses, street lighting, masts and existing turbines (not significant). The effect of the Proposed Development on Shulishader would range from **Substantial / Moderate** and **significant** (western edge of the settlement from a very small number of properties) to Moderate / Slight to No View and not significant (majority of the settlement). The nature of these effects would be long-term (reversible), indirect and negative to neutral. Cumulative Assessment: Proposed Development + Existing + Consented Sites The existing and consented wind farms visible from parts of this settlement would range from Low to Zero magnitude. The additional and combined effects of the Proposed Development would remain **Substantial / Moderate** and **significant** (due to the Proposed Development) to Moderate / Slight to No View and not significant. The nature of these effects would be long-term (reversible), cumulative, indirect and negative to neutral.

Settlement	Assessment
Brue (Bru), Arnol and Bragar (including Labost)	These three linear settlements are located along the A866 as it follows the northern coastline of the Isle of Lewis and located approximately 13.5km northwest of the Proposed Development at their closest point. The theoretical visibility of the Proposed Development from the settlements is indicated in **Figure 6.19**. <u>Assessment: Proposed Development</u> ZTV coverage indicates theoretical visibility of up to eight turbines from parts of all three settlements. The primary views from the settlements are largely towards the coastline and sea to the north. The views of the Proposed Development south from these settlements are limited to blades and blade tips, where visible (Negligible magnitude). There would be no visibility of aviation warning lights from these settlements (not significant). The effect of the Proposed Development on Brue, Arnol and Bragar would be Slight to No View and not significant. The nature of these effects would be long-term (reversible), indirect and negative to neutral. <u>Cumulative Assessment: Proposed Development + Existing + Consented Sites</u> The existing and consented wind farms visible from parts of these settlements would range from Low to Zero magnitude. The additional and combined effects of the Proposed Development would remain Slight to No View and not significant. The nature of these effects would be long-term (reversible), cumulative, indirect and negative to neutral.

Residential Visual Amenity Assessment

6.8.19 A RVAA is reported in **Appendix 6C** with supporting visualisations illustrated in **Figures 6C.1-14**. It should be noted that noise and shadow flicker related factors affecting residential amenity, are not considered as part of this assessment and can be found in **Chapters 12: Noise** and **15: Shadow Flicker** respectfully.

6.8.20 The agreed scope of the RVAA includes all individual residential properties within 2km of the Proposed Development and individual properties and / or clusters of properties just beyond 2km from the Proposed Development, as agreed with CnES on 5 February 2019.

6.8.21 It may be noted that there are no residential properties within 1.8km of the turbines. None of the eight properties between 1.8 - 2km would be affected in terms of their residential visual amenity during the day and at night (including periods of dawn and dusk), although views from all eight (property and / or garden) (No.21 (A858), Rivervalley, No.14A (A858), No.11 (A858), No.14 (A858), No.22 (The Willows), No.6 (A858) and No.19B (A859)) would be **significantly** affected in terms of visual effects.

6.8.22 For the 25 properties just beyond 2km of the Proposed Development, none of the residential properties included in the assessment would be affected in terms of their residential visual amenity during the day and at night (including periods of dawn and dusk). However, 14 of these properties would be **significantly** affected in terms of visual effects (Old Farm House, No. 16B – Croft House, Macs Croft, Sporting Lodge, No. 10 – Loch View, No. 6A – Lochan, No. 20 (Newvalley), No. 3 (A859), No. 5 – Drumrae, Riverside, No.1 – Last House, No. 1a – River View House, No. 2A (Newmarket) and No. 2 – Gleann an t'Sagairt)), while one property (No. 18 (A859)) would be **significantly** affected only during the construction and decommissioning phases. It may be noted the Proposed Development would always be visible in the context of other man-made development (existing turbines, transmission masts, telegraph poles, street lighting poles, fencing, other houses and outbuildings) in views from all of the above residential properties.

6.8.23 A number of these properties could have some visibility of the aviation warning lights, subject to screening from buildings and vegetation.

6.8.24 The experience of a significant view of the Proposed Development is not the same as an unacceptable effect. In terms of residential visual amenity, the RVAA concludes that the Proposed Development would not have an overbearing effect or otherwise affect the living standards of individual properties such that any of these would become an unattractive place to live (as opposed to less attractive) when judged objectively, and in the public interest. This is due to factors such as the intervening distance, screening by intervening landform, vegetation and / or built-form, other man-made development in the views and use / orientation of the property, such that in each case it can be concluded that the living standards would not be affected and the property would not be adversely affected by 'visual dominance' such that it might become widely regarded as an unattractive place to live when judged objectively and in the public interest, on a solus basis or cumulatively.

Visual Effects on Views from Transport Routes

6.8.25 The assessment has focused on four main (A) roads, four minor roads and the Stornoway to Ullapool Ferry Route within 15km of the Proposed Development. The visual effects on views from these routes are set out in **Tables 6.14 to 6.17** and illustrated from three of these routes in **Figures 6.21-6.23.**

6.8.26 Each of these routes were driven or travelled in both directions in order to assess the potential effects and each assessment has been assisted on site with the use of sequential wirelines transects, ZTV maps and True View Visuals 3D software.

6.8.27 In summary, **significant** day-time visual effects would be experienced from parts of seven transport routes, all within 15km of the Proposed Development, as follows:

- A858 (between Marybank and Loch nan Eilean);
- A859 (between Creed Bridge and north of Liurbost);
- A866 (parts of the route between Oliver's Brae and Shulishader);
- Stornoway – Ullapool Ferry Route (between south of Melbost to within Cala Steornabhaig (before approaching the ferry terminal);
- B897 (between the junction of the A859 and junction of the road to Grimshader);
- B895 (between south of Tong and Coll); and
- Pentland Road (between Loch an Tobair and the road junction with the A858).

6.8.28 The nature of effects would be long term (reversible), indirect, cumulative and negative to neutral.

6.8.29 Mitigating factors include the landscape setting of the Proposed Development which would be seen within a large-scale, *Boggy Moorland*, with characteristics that make it suitable for the accommodation of large wind farm development. For most of its operational period, the Proposed Development would also be seen alongside or overlapping with other existing wind farms.

A859

6.8.30 The A859 is a 51km principal transport route which extends southwest from the settlement of Stornoway to the Isle of Harris. The route is located approximately 1km southeast of the Proposed Development at its closest point.

6.8.31 The southern half of the route within 15km is overlapped by the Sustrans Cycle Route 780. The route is not however located within a designated area and its value therefore ranges from Medium in the north to High-Medium in the south. Most road users would experience the landscape transiently whilst driving or cycling and experiencing a sequence of views, often in one direction focused on the direction of travel and often experienced at speed (Medium susceptibility). As a result, the overall sensitivity of road users on this route has been assessed as Medium.

6.8.32 The route is assessed sequentially within the 15km Study Area from south to north in **Table 6.14** below and is illustrated in **Figure 6.21a-f**. This section of the route is approximately 25.6km in length.

Table 6.14 Visual Effects on Views from the A859

Sequential Viewpoint	Description of Effects
1. Baile Ailein	This viewpoint is located east of Baile Ailein, approximately 11km southwest of the Proposed Development and is the first point of theoretical visibility for northbound users. The ZTV indicates that up to 1-8 turbines would be theoretically visible along a short 100m section of the route. The wireline in **Figure 6.21b** indicates that there would be very limited visibility of the turbines beyond intervening landform, limited to blade tips (and one hub) on the horizon, affecting approximately 10° of the horizontal Field of View (FoV). Loch na Deasport is a focal point along this section of the route and the Proposed Development would be visible as a minor feature above and beyond the Loch, gradually receding out of view as the road descends. The magnitude of change would be Negligible and the level of effect would be Slight and not significant.
2. Loch Shobhail car park	This viewpoint is located at the Loch Shobhail car park off the main road, approximately 5.5km south of the Proposed Development. The ZTV indicates that all of the proposed turbines would be theoretically visible along a 1.7km section of the route. The wireline in **Figure 6.21b** indicates that the turbines would be largely visible as blades and blade tips affecting approximately 25° of the horizontal FoV. Loch Shobhail is a focal point along this section of the route and the Proposed Development would be visible as a minor feature beyond this. The magnitude of change would be Low-Negligible and the level of effect would be Slight to Slight / Negligible and not significant.
3. Liurbost	This viewpoint is located at the junction of the A859 and C35 roads at Liurbost, approximately 3.8km south of the Proposed Development. The ZTV indicates very limited theoretical visibility of the turbines along this section of the route at Liurbost. The wireline in **Figure 6.21c** indicates that the turbines would be screened by landform and housing. The magnitude of change would be Zero and the level of effect would be No View and not significant.
4. North of Liurbost	This viewpoint (visual assessment viewpoint 3) is located on a layby to the north of Loch Sanndabhat and Liurbost, approximately 2.8km south of the Proposed Development. The wireline in **Figure 6.21c** indicates that all of the proposed turbines would be theoretically visible within the view affecting approximately 58° of the horizontal FoV and would be seen in the context of other man-made development including telegraph poles and existing wind farms in a large-scale landscape. The magnitude of change would be High-Medium and the level of effect would be **Substantial / Moderate to Moderate** and **significant**.
5. Druim Dubh	Between viewpoints 4 and 5, the A859 traverses open moorland with clear views of the surrounding landscape. This viewpoint is located on an informal layby at Druim Dubh (a derelict and abandoned property) and is the closest point to the Proposed Development at approximately 1km distance. The wireline in **Figure 6.21d** indicates that all of the proposed turbines would be visible across open moorland affecting approximately 90° of the horizontal FoV. The proposed turbines would be visible at right angles to the road and would be visible alongside other man-made development including pylons, telegraph poles and existing wind farms. The magnitude of change would be High and the level of effect would be **Substantial / Moderate** and **significant**.
6. Macaulay Farm	Between viewpoints 5 and 6, the A859 continues to traverse open moorland with clear views west of the surrounding landscape. This viewpoint is located on a layby with a substation opposite Macaulay Farm, approximately 2km east of the Proposed Development. The wireline in **Figure 6.21d** indicates that all of the proposed turbines would be visible across open moorland affecting approximately 90° of the horizontal FoV. The proposed turbines would be visible at oblique to right angles to the road alongside other man-made development including pylons, telegraph poles and existing wind farms. The magnitude of change would be High and the level of effect would be **Substantial / Moderate** and **significant**.
7. Creed Bridge car park	At Creed Bridge, the open views across moorland are more inhibited as the road dips towards the Abhainn Ghrioda where Creed Bridge is located. This viewpoint is located at Creed Bridge car park, approximately 2.2km east of the Proposed Development. This point also denotes the start of the settlement of Greater Stornoway (Marybank) which is located to the north of the bridge.

Sequential Viewpoint	Description of Effects
	The wireline in **Figure 6.21e** indicates up to 27 turbines (combination of hubs, upper parts of turbine towers, blades and blade tips) would be theoretical visible beyond rising landform to the west and south, affecting approximately 75° of the horizontal FoV. Mature woodland and other vegetation in the foreground would screen parts of the turbines further. The proposed turbines would be visible at oblique angles to the road and would be seen in the context of other man-made development. The magnitude of change would be High-Medium and the level of effect would be **Substantial / Moderate to Moderate** and **significant**.
8. Marybank Quarry	This viewpoint is located at the junction of the road with the entrance to Marybank Quarry, approximately 2.2km east of the Proposed Development. The wireline in **Figure 6.21e** indicates that all of the turbines would be theoretically visible, affecting approximately 90° of the horizonal FoV. However, roadside and more distant vegetation, and machinery associated with the quarry would screen the majority of the turbines. The magnitude of change would be Medium and the level of effect would be Moderate and not significant.
9. Junction with Bennadrove Road	This viewpoint is located at the junction with Bennadrove Road, approximately 2.8km east of the Proposed Development. As the A859 continues into the settlement of Stornoway, roadside vegetation and buildings increase along the route, providing a degree of screening of the Proposed Development for road users. The wireline in **Figure 6.21f** indicates that all the proposed turbines would be visible as hubs and towers, affecting approximately 72° of the horizontal FoV. However, the majority of the turbines would be screened by built-form and vegetation. The magnitude of change would be Negligible and the level of effect would be Slight and not significant.
10. Junction with Memorial Avenue	This viewpoint is located at the junction with Memorial Avenue, approximately 3.2km east of the Proposed Development. The wireline in **Figure 6.21f** indicates that there would be very limited visibility of the turbines due to intervening landform, affecting approximately 18° of the horizontal FoV. However, all of the turbines would be screened by mature woodland in the foreground. The magnitude of change would be Zero and the level of effect would be No View and not significant.

6.8.33 In summary, the experience of significant visual effects would be limited to approximately 6km of the route (for northbound and southbound road users), occurring between Creed Bridge and north of Liurbost (sequential viewpoints 4-7). The magnitude of change would range between High and High-Medium and the level of visual effect would range between **Substantial / Moderate to Moderate** and **significant**. The nature of these effects would be long term (reversible), indirect and negative to neutral.

6.8.34 Aviation warning lights would be visible along this part of the route in the context of other light sources associated with existing turbines, masts and vehicles (**significant** within approximately 5km).

6.8.35 Elsewhere along the route within the 15km Study Area, the Proposed Development would be either partly visible or not visible due to the screening effects of landform, built-form and / or vegetation. The views from these sections of the route would not be significantly affected by the Proposed Development with the visual effects being Moderate to No View.

Cumulative Assessment: Proposed Development + Existing + Consented Sites

6.8.36 There would be frequent visibility of existing wind farms along the route. The existing Creed and Arnish Moor Wind Farms (High magnitude) would be visible in close proximity from the eastern parts the route. The remaining existing and consented wind farms visible from the route would be of Medium to Zero magnitude due to intervening screening and distance. The additional effect of the Proposed Development would remain **Substantial / Moderate to Moderate** and **significant** to **No View** and not significant. The combined effect would be **Substantial / Moderate** and **significant** (due to the Proposed Development, Creed and Arnish Moor) to No View and not significant. Unless consent is granted to extend their operation, Creed and Arnish Moor would be decommissioned approximately 5-10 years prior to the end of the operation of the Proposed Development, reducing this cumulative effect. The nature of these effects would be long-term (reversible), cumulative, indirect and negative to neutral.

Stornoway – Ullapool Ferry Route

6.8.37 This ferry route is a scheduled service, run by Caledonian MacBrayne, which runs twice daily between Stornoway and Ullapool (approximately 82km journey). Within the 15km Study Area, the ferry route is routed between east of Chicken Head and Stornoway Ferry Terminal, passing to the east of the Proposed Development at approximately 4km at its closest point.

6.8.38 The ferry route is not located within a designated area, however, it is a promoted route for visitors and residents, and its value is therefore considered to be High-Medium. The view would be experienced by visitors and residents on the ferry with transitory views, whose attention or interest is likely to be focused on the surrounding landscape / seascape. Therefore, susceptibility to change is assessed as High-Medium and the overall sensitivity is assessed as High-Medium.

6.8.39 The route is assessed sequentially within the 15km Study Area from southeast to northwest in **Table 6.15** below and is illustrated in **Figure 6.23a-c**. This section of the route is approximately 12km in length.

Table 6.15 Visual Effects on Views from the Stornoway – Ullapool Ferry Route

Sequential Viewpoint	Description of Effects
1. Ferry Route, southeast of Chicken Head	This viewpoint (visual assessment viewpoint 16) is located southeast of Chicken Head at approximately 13.3km southeast of the Proposed Development. The wireline in **Figure 6.23b** indicates that all of the turbines would be theoretically visible beyond intervening landform and the settlement of Stornoway, in an open, expansive landscape / seascape, affecting approximately 23° of the horizontal FoV. The lower parts of some of the turbines would be partially screened further by mature vegetation within Lews Castle and Lady Lever Park GDL. The magnitude of change would be Medium-Low and the level of effect would be Moderate and not significant. The level of effect would not be significant due to screening by intervening landform and vegetation, large-scale of the receiving landscape / seascape, transitory nature of the views and the distance of the viewpoint.
2. Ferry Route, south of Melbost	This viewpoint is located to the south of Melbost and southwest of Chicken Head at approximately 9.6km southeast of the Proposed Development. The wireline in **Figure 6.23b** indicates that all of the turbines would be theoretically visible beyond intervening landform and the settlement of Stornoway, in an open, expansive landscape / seascape, affecting approximately 30° of the horizontal FoV. The lower parts of some of the turbines would be partially screened further by mature vegetation within Lews Castle and Lady Lever Park GDL. The rugged coastline and coastal features of the Isle of Lewis would be more apparent in the views. Several existing wind farms would be visible including Pentland Road, Beinn Ghrideag, Creed, Arnish Moor and Bridge cottages which would be more apparent on the horizon. The magnitude of change would be Medium and the level of effect would be **Moderate** and **significant**.
3. Ferry Route, Cala Steornabhaig	This viewpoint (visual assessment viewpoint 8) is located within Stornoway Harbour (Cala Steornabhaig) as the ferry approaches the town and past Iolaire Monument, approximately 5.2km east of the Proposed Development. The wireline in **Figure 6.23c** indicates that all of the turbines would be theoretically visible beyond intervening landform and the settlement of Stornoway, affecting approximately 48° of the horizontal FoV. These views would be screened further by mature vegetation within Lews Castle and Lady Lever Park GDL, partially reducing the visibility of the turbines. Parts of a number of existing wind farms would be visible including Pentland Road, Beinn Ghrideag, Creed and Arnish Moor on the horizon. The magnitude of change would be High-Medium and the level of effect would be **Substantial / Moderate** and **significant**.

Sequential Viewpoint	Description of Effects
4. Ferry Route, Stornoway Ferry Terminal	This viewpoint (Viewpoint B, **Appendix 6E**) is located at the end of the route at Stornoway Ferry Terminal, approximately 4km east of the Proposed Development. The wireline in **Figure 6.23c** indicates that there would be very limited visibility of the turbines limited to blades and blade tips, which would be further screened by mature vegetation within Lews Castle and Lady Lever Park GDL. At this point, the settlement of Stornoway and the harbour would be the primary view from the ferry considering the close distance. The magnitude of change would be Low-Negligible and the level of effect would be Slight and Not Significant.

6.8.40 In summary, the experience of significant visual effects would be limited to approximately 5km of the Stornoway-Ullapool Ferry Route (in both directions), occurring between south of Melbost to within Cala Steornabhaig (before approaching the ferry terminal). The magnitude of change would range between High-Medium and Medium and the level of visual effect would range between **Substantial / Moderate to Moderate** and **significant**. The nature of these effects would be long term (reversible), indirect and negative to neutral.

6.8.41 Aviation warning lights would be visible along this part of the route in the context of other light sources associated with the settlement of Stornoway, existing turbines and masts (**significant** within approximately 10km).

6.8.42 Elsewhere along the Ferry Route and within the 15km Study Area, the Proposed Development would be only partly visible due to the screening effects of landform and vegetation, and would become less apparent as the distance increases. The views from these sections of the Ferry Route would not be significantly affected by the Proposed Development with the visual effects being Slight to Negligible.

Cumulative Assessment: Proposed Development + Existing + Consented Sites

6.8.43 The existing and consented wind farms visible from the route would be of Low to Zero magnitude due to intervening screening and distance. The additional effect of the Proposed Development would remain **Substantial / Moderate to Moderate** and **significant** to Slight to Negligible and not significant. The combined effect would be **Substantial / Moderate to Moderate** and **significant** (due to the Proposed Development) to Slight to Negligible and not significant. The nature of these effects would be long-term (reversible), cumulative, indirect and negative to neutral.

Rathad a' Phentland (Pentland Road)

6.8.44 Pentland Road is an approximately 16km minor road which extends from the A858 junction in the west to Carlabhagh and Breascleit in the east. The entire route is within the 15km Study Area, approximately 859m at its closest point west of the Proposed Development (nearest turbine).

6.8.45 The route is not located within a designated area, however, part of the route is overlapped by the Timeless Way, and the value of the route is therefore considered to be High-Medium. Most of the road users would experience the landscape transiently whilst driving or cycling and experiencing a sequence of views, often in one direction focused on the direction of travel and often experienced at speed (Medium susceptibility). Walkers, however, would experience the views over a longer period and be more aware of the wider 360° views. No walkers were observed during the site visits. The overall sensitivity of road users on this route has been assessed as High-Medium.

6.8.46 The route is assessed sequentially within the 15km Study Area from west to east in **Table 6.16** below and is illustrated in **Figure 6.22a-d**. Views of the Proposed Development would only be experienced by eastbound users along the route.

Table 6.16 Visual Effects on Views from Rathad a' Phentland (Pentland Road)

Sequential Viewpoint	Description of Effects
1. Loch an Tuim	This viewpoint (visual assessment viewpoint 13) is located on a layby at Loch an Tuim, approximately 10km west of the Proposed Development, and would be the first visibility of the Proposed Development from this section of the route. The wireline in **Figure 6.22b** indicates that there would be limited visibility of the turbines beyond the loch and intervening landform, limited to blades and blade tips (and a small number of hubs) on the horizon, affecting approximately 25° of the horizontal FoV. The magnitude of change would be Low and the level of effect would be Moderate to Moderate / Slight and not significant.
2. Loch an Laoigh	This viewpoint is located on a layby at Loch an Laoigh, approximately 8.5km west of the Proposed Development. Views towards the Proposed Development become intermittent as the road climbs and passes local rock outcrops. At Loch an Laoigh, gently undulating landform partially screens views in the direction of the Proposed Development. The wireline in **Figure 6.22b** indicates that there would be limited visibility of the turbines beyond the loch and intervening landform, limited to blades and blade tips (and a small number of hubs) on the horizon, affecting approximately 28° of the horizontal FoV. The magnitude of change would be Low to Negligible and the level of effect would be Moderate / Slight and not significant.
3. Loch an Tobair	This viewpoint is located on a layby at Loch an Tobair, approximately 5.4km west of the Proposed Development. The wireline in **Figure 6.22c** indicates that all of the turbines would be visible affecting approximately 48° of the horizontal FoV. The lower parts of the turbines would be screened by intervening landform. The turbines would be seen across moorland in a wide, open landscape already influenced by existing turbines. The magnitude of change would be Medium and the level of effect would be **Substantial / Moderate** and **significant**.
4. Eastern end of Pentland Road / A858 junction	This viewpoint is located at the eastern end of Pentland Road with the junction of the A858, approximately 859m west of the Proposed Development. The wirelines in **Figure 6.22c-d** indicate that the proposed turbines would be visible in an approximate 250° horizontal FoV from the north, east and south. Despite the close proximity, some of the turbine towers would be partially screened by rising landform to the east and south. The Proposed Development would be most visible in views to the north and east, and would be seen in the context of the existing Beinn Ghrideag and Pentland Road, also in close proximity to the route. The magnitude of change would be High and the level of effect would be **Substantial to Substantial / Moderate** and **significant**.

6.8.47 In summary, the experience of significant visual effects would be limited to approximately 6km of the route (for eastbound road users), occurring between Loch an Tobair and the road junction with the A858 (sequential viewpoints 3-4). The views of westbound road users would not be affected. The magnitude of change would range between High and Medium and the level of visual effect would range between **Substantial to Substantial / Moderate** and **significant**. The nature of these effects would be long term (reversible), indirect and negative to neutral.

6.8.48 Aviation warning lights would be visible along this part of the route in the context of other light sources associated with existing turbines and masts (**significant** within approximately 5km).

6.8.49 Elsewhere along the route within the 15km Study Area, the Proposed Development would be partly visible or not visible due to the screening effects of landform. The views from these sections of the route would not be significantly affected by the Proposed Development with the visual effects being Moderate / Slight to No View.

Cumulative Assessment: Proposed Development + Existing + Consented Sites

6.8.50 The existing Beinn Ghrideag (High magnitude) and Pentland Road (High-Medium magnitude) would be visible in close proximity from the eastern parts the route. The remaining existing and consented wind farms visible from the route would be of Negligible to Zero magnitude due to intervening screening and distance. The additional effect of the Proposed Development would remain **Substantial to Substantial / Moderate** and **significant** to Moderate / Slight to No View and not significant. The combined effect would be **Substantial to Substantial / Moderate** and **significant** (due to the Proposed Development, Beinn Ghrideag and Pentland Road) to Moderate / Slight to No View and not significant. Unless consent is granted to extend their operation, Pentland Road and Beinn Ghrideag would be decommissioned approximately 3-5 years prior to the end of the operation of the Proposed Development, reducing this cumulative effect. The nature of these effects would be long-term (reversible), cumulative, indirect and negative to neutral.

Other Roads within 15km

6.8.51 The assessment of visual effects from other roads within the 15km Study Area is set out in **Table 6.17** and includes the A858, A857, A866, B897, B895 and B8060.

Table 6.17 Visual Effects on Views from other Roads within 15km

Transport Route	Assessment
A858	The A858 is a principal transport route that extends west from Stornoway (Marybank), turning southwest at Pentland Road past the Proposed Development, continuing west towards Calanais at Acha Mor, before extending along the coast towards Barvas and joining the A857. Recent Ordnance Survey maps indicate that the A858 continues east from Acha Mor and meets the A859, rather than passing through the Development Site. CnES have, however, confirmed[8] that the A858 currently turns off at Acha Mor and runs to Marybank. At its closest point, the route is located approximately 142m from the Proposed Development as it passes through the Development Site in the north and is approximately 35km in length within the 15km Study Area. Visibility of the Proposed Development is illustrated by Viewpoints 1 (**Figure 6.24a-e**), Sequential Viewpoint 4 (**Figure 6.22c-d)** and a number of residential viewpoints in **Appendix 6C**. The entire route is overlapped by the Sustrans Cycle Route 780, and with small sections overlapped by the Timeless and Hebridean Way recreational routes. The route, however, is not located within a designated area and its value is therefore assessed as High to Medium. Most of the road users would experience the landscape transiently whilst driving or cycling and experiencing a sequence of views, often in one direction focused on the direction of travel and often experienced at speed (Medium susceptibility). Walkers, however, would experience the views over a longer period and be more aware of the wider 360° views. There were no walkers present during the site visits. As a result, the overall sensitivity of road users on this route has been assessed as High-Medium. <u>Assessment: Proposed Development</u> ZTV coverage is most prevalent for approximately 11km of the section of the route between Marybank and north of Achamore, as illustrated in Viewpoint 1 and Pentland Road / A858 Sequential Viewpoint 4. The greatest theoretical visibility where the turbines would be clearly visible would be for approximately 8km between west of Marybank and south of Viewpoint 1 (near Loch nan Eilean) where the Proposed Development would be closest to the route (High magnitude). The existing turbines at Beinn Ghrideag and Pentland Road are also located in close proximity and are clearly visible from this section of the route. As the road passes through Marybank, visibility of the Proposed Development would vary due to built-form, vegetation and / or landform (High to Zero magnitude). From south of Viewpoint 1 to north of Achamore, visibility of the Proposed Development would vary (Low magnitude) due to landform with no visibility from Achamore itself (Zero magnitude). Between Achamore, Calanais and the A857 junction, visibility reduces markedly due to landform limited to upper parts of the turbines to no views of the Proposed Development (Low-Negligible to Zero magnitude). Aviation warning lights would be visible from the same sections of the route as described above, with the greatest visibility between Marybank and north of Achamore, where visible, and in the context of other light sources associated with existing turbines, houses, street lighting, vehicles and masts (**significant** within approximately 5km).

[8] Email correspondence dated 11 December 2018.

Transport Route	Assessment
	The magnitude of change would range from High to Zero and the effect would be **Substantial to Substantial / Moderate** and **significant** (for 8km of the route between Marybank and Loch nan Eilean) to No View and not significant. The nature of these effects would be long-term (reversible), indirect and negative to neutral. <u>Cumulative Assessment: Proposed Development + Existing + Consented Sites</u> The existing Beinn Ghrideag, Pentland Road and Monan turbines would be clearly visible as the route passes in close proximity (all High to Zero magnitude). The remaining existing and consented wind farms visible would be of Negligible to Zero magnitude due to intervening screening and distance. The cumulative magnitude of change of existing and consented wind farms would be High. The additional effect of the Proposed Development would remain **Substantial to Substantial / Moderate** and **significant** to No View and not significant. The combined effect would be **Substantial to Substantial / Moderate** and **significant** (due to the Proposed Development, Beinn Ghrideag, Pentland Road and Monan) to No View and not significant. Unless consent is granted to extend their operation, Pentland Road and Beinn Ghrideag would be decommissioned ~3-5 years prior to the end of the operation of the Proposed Development, reducing this cumulative effect. The nature of these effects would be long-term (reversible), cumulative, indirect and negative to neutral.
A857	The A857 is a principal transport route connecting the settlement of Stornoway to Port of Ness in the north, and is located approximately 3.1km northeast of the Proposed Development at its closest point. The route is approximately 43km in length and the views along the route are illustrated by Viewpoints 7 (**Figure 6.30a-h**) and 21 (**Figure 6.42a-d**). The route is not a designated route or located within a designated area and the value of the route is therefore assessed as Medium. Most of the road users would be driving / cycling or travelling at speed and viewing the landscape in one direction as a sequence of views. Therefore, susceptibility to change is assessed as Medium and the overall sensitivity of road users on this route is assessed as Medium. <u>Assessment: Proposed Development</u> ZTV coverage indicates continuous theoretical visibility of the Proposed Development for approximately 11.5km of the route between Stornoway and south of Barvas. Views from this route are generally open in all directions across open moorland with long-distance visibility towards the North Harris Mountains and Western Highlands. The greatest visibility of the Proposed Development would be southbound from north of Loch Roisneabhat (Viewpoint 7) to south of Loch Duibh before the route approaches Newmarket in Greater Stornoway (Medium magnitude). The turbines would be visible at an oblique angle to the road and would appear lower than the summit of Beinn Bharabhais. Within Greater Stornoway, visibility would be limited due to screening by intervening landform, built-form and / or vegetation (Negligible magnitude). Between Loch Roisneabhat and south of Barvas, the landform begins to drop towards the north with visibility limited to the upper parts of the turbines (Medium-Low to Low magnitude). Between Barvas and Port of Ness, visibility would be more intermittent and limited to hubs, blades and blade tips subject to further screening by built-form (Low to Zero magnitude). Aviation warning lights would be visible from the same sections of the route as described above, with the greatest visibility between north of Loch Roisneabhat to south of Loch Duibh, and seen in the context of other lighting from existing turbines, street lighting, houses, vehicles and masts, as illustrated in Viewpoint N7 (**Figure 6D.6, Appendix 6D**) (**significant**). The magnitude of change would range from Medium to Zero and the effect would be Moderate to No View and not significant for southbound users. Northbound users would not be affected by the Proposed Development. The effect would not be significant due to a number of factors including the transient and oblique views available from this road, other vertical elements in the view, large-scale of the receiving landscape, a narrow FoV and distance from the route. The nature of these effects would be long-term (reversible), indirect and negative to neutral. <u>Cumulative Assessment: Proposed Development + Existing + Consented Sites</u> The existing Baile an Truiseil and Bridge Cottages turbines would be visible in close proximity as the route passes north of Barvas and approaches Greater Stornoway (both High to Zero magnitude). The existing Pentland Road Wind Farm would be visible alongside the Proposed Development from the majority of the route (Medium to Low to Zero magnitude). The remaining existing and consented wind farms visible would be of Low to Negligible to Zero magnitude due to intervening screening and distance. The cumulative magnitude of change of existing and consented wind farms would be High. The additional effect of the Proposed Development would remain Moderate to No View and not significant.

Transport Route	Assessment
	The combined effect would be **Substantial / Moderate** and **significant** (due to Baile an Truiseil and Bridge Cottages and not the Proposed Development) to No View and not significant. Unless consent is granted to extend its operation, Bridge Cottages would be decommissioned approximately 5 years prior to the end of the operation of the Proposed Development, reducing this cumulative effect. The nature of these effects would be long-term (reversible), cumulative, indirect and negative to neutral.
A866	The A866 is the principal transport route connecting Stornoway to the Eye Peninsula / An Rubha. It is approximately 17km in length and is located 3.8km east of the Proposed Development. Visibility of the Proposed Development from the route is illustrated by Viewpoints 18 (**Figure 6.41a-e**) and 26 (**Figure 6.48a-e**). The route is not a designated route or located within a designated area and its value is therefore assessed as Medium. Most of the road users would be driving / cycling or travelling at speed and viewing the landscape in one direction as a sequence of views. Therefore, susceptibility to change is assessed as Medium and the overall sensitivity of road users on this route is assessed as Medium. Assessment: Proposed Development ZTV coverage indicates almost continuous theoretical visibility for much of the route, with the exception of a 1km section to the east of Garrabost and 2km section around Aird and Cnoc Amhlaigh. Views of the Proposed Development would only be available for westbound users. There would be visibility of the turbines from approximately 75% of the route, subject to screening by built-form and / or vegetation. Visibility for westbound users along the route would vary with distance between Oliver's Brae and Shulishader, as illustrated in Viewpoints 18 and 26 (High-Medium to Medium-Low to Zero magnitude). Where visible, the turbines would always appear in wide, open views, beyond intervening landform and the settlement of Stornoway, and in the context of other man-made development including existing turbines. Views of the Proposed Development from the route within the core settlement of Stornoway are limited due to screening by intervening landform, built-form and vegetation. Aviation warning lights would be visible from the same sections of the route as described above, and visible in the context of other light sources associated with existing turbines, houses, street lighting, vehicles, and masts (**significant** within approximately 10km). The magnitude of change would range from High-Medium to Zero and the effect would be **Substantial / Moderate** and **significant** for westbound users (for 10km of the route between Oliver's Brae and Shulishader, however, not significant for throughout this length of route) to No View and not significant. Eastbound users would not be affected by the Proposed Development. The nature of these effects would be long-term (reversible), indirect and negative to neutral. Cumulative Assessment: Proposed Development + Existing + Consented Sites The existing Beinn Ghrideag and Pentland Road turbines would be visible alongside and as part of the Proposed Development (both Medium to Low to Zero magnitude). The existing Arnish Moor, Creed, North Tolsta and consented Druim Lethann wind farms would be visible from the majority of the route (Low to Low-Negligible to Zero magnitude). The remaining existing and consented wind farms visible would be of Negligible to Zero magnitude due to intervening screening and distance. The cumulative magnitude of change of existing and consented wind farms would be Medium to Low to Zero. The additional effect of the Proposed Development would remain **Substantial / Moderate** and **significant** to No View and Not Significant. The combined effect would be **Substantial / Moderate** and **significant** (due to the Proposed Development). The nature of these effects would be long-term (reversible), cumulative, indirect and negative to neutral.
B897	The B897 is an 8km minor road which extends from the A859 in the north to the settlement of Ranais in the south and is located approximately 1.1km southeast of the Proposed Development. Visibility of the Proposed Development from the route is illustrated by viewpoint 27 (**Figure 6.49a-e**). The route is not a designated route or located within a designated area and the value of the route is therefore assessed as Medium. Most of the road users would be driving / cycling or travelling at speed and viewing the landscape in one direction as a sequence of views. Therefore, susceptibility to change is assessed as Medium and the overall sensitivity of road users on this route is assessed as Medium. Assessment: Proposed Development ZTV coverage indicates continuous theoretical visibility of the Proposed Development for approximately 5km of the route, where there would be little in the way of screening or filtering, however visibility of the turbines would vary from being wholly visible in the north to partial visibility of hubs, blades and blade tips in the south. The greatest visibility of the turbines would be for northbound users from approximately 3.5km of the route between the junction of the A859 and junction of the road to Grimshader (High to Medium magnitude).

Transport Route	Assessment
	The existing Arnish Moor turbines would be prominent from much of the northern section of the route. Between the junction of the road to Grimshader, visibility of the Proposed Development would reduce due to screening by intervening landform and other built-form (Low to Zero magnitude). In all views, the proposed turbines would be visible in wide, open views across moorland and in the context of other man-made development including the existing turbines at Arnish Moor, Creed, Beinn Ghrideag and Pentland Road. Aviation warning lights would be visible from the same sections of the route as described above with the greatest visibility between the A859 junction and the junction of the road to Grimshader and seen in the context of other light sources associated with existing turbines, houses, street lighting, vehicles and masts (**significant** within approximately 5km). The magnitude of change would range from High to Medium to Zero and the effect would be **Substantial / Moderate to Moderate** and **significant** (3.5km of the route between the junction of the A859 and junction of the road to Grimshader) to No View and not significant for northbound users. Southbound users would not be affected by the Proposed Development. The nature of these effects would be long-term (reversible), indirect and negative to neutral. <u>Cumulative Assessment: Proposed Development + Existing + Consented Sites</u> The existing Arnish Moor turbines would be most prominent from parts of the route (High to Zero magnitude). The existing Pentland Road and Beinn Ghrideag wind farms would be visible behind Arnish Moor (both Low magnitude). Creed would be visible as a separate development to the right of Arnish Moor (Low magnitude). The remaining existing and consented wind farms visible would be of Low-Negligible to Zero magnitude due to intervening screening and distance. The cumulative magnitude of change of existing and consented wind farms would be High to Zero. The additional effect of the Proposed Development would remain **Substantial / Moderate to Moderate** and **significant** to No View and not significant. The combined effect would be **Substantial / Moderate** and **significant** (due to the Proposed Development and Arnish Moor). Arnish Moor would be decommissioned approximately 10 years prior to the end of the operation of the Proposed Development, reducing this cumulative effect. The nature of these effects would be long-term (reversible), cumulative, indirect and negative to neutral.
B895	The B895 is a 20km minor road connecting Newmarket in Greater Stornoway to North Tolsta (via Tong and Coll) and is located approximately 3.5km northeast of the Proposed Development at its closest point. Visibility of the Proposed Development from the route is illustrated by Viewpoints 9 (**Figure 6.32a-e**), 12 (**Figure 6.35a-e**), 22 (**Figure 6.44a-d**) and C (**Figure 6E.3, Appendix 6E**). Users of this route have their primary views out towards Broad Bay and the Eye Peninsula. The Timeless Way overlaps the entire length of this route, however, it is not located within a designated area and the value of the route is therefore assessed as High to Medium. Most of the road users would be driving / cycling or travelling at speed and viewing the landscape in one direction as a sequence of views. Therefore, susceptibility to change is assessed as Medium and the overall sensitivity of road users on this route is assessed as High to Medium. <u>Assessment: Proposed Development</u> ZTV coverage indicates theoretical visibility of the Proposed Development from the majority of the route, albeit visibility for southbound users would be subject to further screening by built-form and some vegetation associated with Tong, Coll, Back, Gress, North Tolsta and Newmarket. In these views, visibility would be limited to the upper parts of the turbines, as illustrated in Viewpoints 9 and 12, where the greatest visibility of the Proposed Development would be available (High-Medium to Medium-Low magnitude – for 7km of the route). The turbines would appear in a view already influenced by wind farms and other man-made development, and would be seen in an open, expansive landscape. Between south of Tong and Newmarket, visibility would be limited due to screening by intervening vegetation, built-form and landform (Low to Zero magnitude). Between the settlements of Back, Gress, and North Tolsta, visibility would vary due to distance, as illustrated in Viewpoints C and 22 (Low-Negligible to Zero magnitude). Aviation warning lights would be visible from the same sections of the route as described above with the greatest visibility between south of Tong and Coll, and visible in the context of other light sources associated with existing turbines, houses, street lighting, vehicles and masts, as illustrated in Viewpoint N9 (**Figure 6D.7**) (not significant). The magnitude of change would range from High-Medium to Zero and the effect would be **Substantial to Substantial / Moderate** and **significant** (7km of the route between south of Tong and Coll) to No View and not significant for southbound users. Northbound users would not be affected by the Proposed Development. The nature of these effects would be long-term (reversible), indirect and negative to neutral. <u>Cumulative Assessment: Proposed Development + Existing + Consented Sites</u>

Transport Route	Assessment
	The existing North Tolsta and consented Druim Lethann turbines would be most prominent from parts of the route in the north (High to Zero magnitude). The remaining existing and consented wind farms visible would be of Low to Zero magnitude due to intervening screening and distance. The cumulative magnitude of change of existing and consented wind farms would be High to Zero. The additional effect of the Proposed Development would remain **Substantial to Substantial / Moderate** and **significant** to No View and not significant. The combined effect would be **Substantial to Substantial / Moderate** and **significant** (due to the Proposed Development, North Tolsta and Druim Lethann). The nature of these effects would be long-term (reversible), cumulative, indirect and negative to neutral.
B8060	The B8060 is a 21.5km minor road which follows the rocky headlands to the south of Loch Eireasort extending southeast from the A859 at Baile Ailein to Leumrabhagh and is located approximately 10.6km south of the Proposed Development at its closest point. Visibility of the Proposed Development from the route is illustrated by Viewpoint 15 (**Figure 6.38a-e**). The route is not a designated route or located within a designated area and the value of the route is therefore assessed as Medium. Most of the road users would be driving / cycling or travelling at speed and viewing the landscape in one direction as a sequence of views. Therefore, susceptibility to change is assessed as Medium and the overall sensitivity of road users on this route is assessed as Medium. <u>Assessment: Proposed Development</u> ZTV coverage indicates limited theoretical visibility of the Proposed Development from this route with the greatest visibility along an approximately 4km section around Garyvard and Kershader, as illustrated by Viewpoint 15 (Medium-Low to Zero magnitude). The turbines would appear, at oblique angles, beyond the loch and intervening landform, as an even spread incorporating the existing Pentland Road and Beinn Ghrideag wind farms and in a part of the view already influenced by other man-made development and would be seen in an open, expansive landscape. Views from other sections of the route would be limited by the intervening topography and / or built-form. Aviation warning lights would be visible from limited sections of the route with the greatest visibility around Garyvard and Kershader, and seen in the context of other light sources associated with existing turbines, houses, street lighting, vehicles and masts (not significant). The magnitude of change would range from Medium-Low to Zero and the effect would be Moderate to Moderate / Slight to No View and not significant. The nature of these effects would be long-term (reversible), indirect and negative to neutral. <u>Cumulative Assessment: Proposed Development + Existing + Consented Sites</u> The existing and consented wind farms visible would be of Low to Zero magnitude due to intervening landform and distance. The additional and combined effects of the Proposed Development would remain Moderate to Moderate / Slight to No View and not significant. The nature of these effects would be long-term (reversible), cumulative, indirect and negative to neutral.

Visual Effects on Views from Recreational Routes

6.8.52 The assessment has considered the potential visual effects likely to be experienced by people (walkers / cyclists / horse riders / joggers / others) on recreational routes within the Study Area. The assessment has been split into local routes on the Core Path Network (which has been sourced from the CnES adopted Core Path Plan) within 15km, and national or regional long-distance routes and Sustrans cycle routes have been assessed within 35km. The assessment of local routes is set out in **Table 6.18** and assessment of national and regional routes is set out in **Table 6.19**. The locations of the recreational routes are illustrated in **Figures 6.17-18**.

6.8.53 Each of these routes were walked and / or visited and walked in sections according to the ZTV coverage and the assessment has been assisted on site with the use of sequential wirelines and True View Visuals 3D software.

6.8.54 All of the routes have been assessed as being of High sensitivity on account of their High to Medium value as recreational routes and the High susceptibility of the people using these routes, mostly walkers and cyclists, whose attention would be focused on the landscape around them.

6.8.55 In summary, **significant** day-time visual effects would be experienced from three recreational routes as follows:

- Core Path 6 (from elevated parts of the route);
- Hebridean Way (between Marybank and Loch nan Eilean); and
- Timeless Way (between west of Marybank and Pentland Road, and between northeast of Stornoway and Coll).

6.8.56 Mitigating factors to consider alongside these significant effects include the landscape setting of the Proposed Development which would be seen within a large-scale, *Boggy Moorland* with characteristics that make it suitable for the accommodation of large wind farm development. During most of its operational period, the Proposed Development would be seen alongside or overlapping with other existing and consented wind farms.

Table 6.18 Visual Effects on Views from Local Recreational Routes within 15km

Receptor	Description of Effects
Local Recreational Routes within 15km	
Core Path 6	Core Path 6 is a network of paths within Lews Castle and Lady Lever Park GDL, located approximately 2km east of the Proposed Development, and is approximately 23km in length. A view from the highest point of the Core Path within the GDL is illustrated by Viewpoint 4 (**Figure 6.27a-e**). Assessment: Proposed Development ZTV coverage indicates theoretical visibility of the Proposed Development from approximately 12km of the route within the GDL. Visibility from this route is fragmented despite its close proximity due to the screening by intervening landform and mature woodland associated with the GDL. There would be localised areas (i.e. more elevated vantage points / areas of lesser tree cover) from western and southern parts of the route where there would be more open views of the Proposed Development, as illustrated by Viewpoint 4 (High magnitude). The turbines would be visible in close proximity from these short sections of the route, however, the views would be wide and panoramic, and the turbines would be seen in the context of other existing man-made elements with the primary views remaining towards the settlement of Stornoway and the sea. From the remainder of route (11km), there would be very limited or no visibility of the Proposed Development (Negligible to Zero magnitude). Aviation warning lights would be visible from the same western and southern sections of the route as described above, and seen in the context of other light sources from existing turbines, masts and the settlement of Stornoway (Significant from elevated sections only). The magnitude of change would range from High to Zero and the effect would be **Substantial** and **significant** (elevated vantage points / areas of lesser tree cover from western and southern parts of the route) to No View and not significant (for the remaining 11km). The nature of these effects would be long-term (reversible), indirect and negative to neutral. Cumulative Assessment: Proposed Development + Existing + Consented Sites The existing Creed, Beinn Ghrideag and Pentland Road wind farms (all Medium to Zero magnitude) would be visible from parts of the route to the west / northwest, with Beinn Ghrideag and Pentland Road appearing behind the proposed turbines. The existing Arnish Moor Wind Farm would be further visible to the southwest (Medium to Low to Zero magnitude). Other existing and consented wind farms visible would be of Negligible to Zero magnitude due to intervening landform and distance. The cumulative magnitude of change of existing and consented wind farms would be Medium to Zero. The additional effect of the Proposed Development would remain **Substantial** and significant to No View and not significant. The combined effect would be **Substantial** and **significant** (due to the Proposed Development, Pentland Road, Beinn Ghrideag and Creed) to No View and not significant. Unless consent is granted to extend their operation, Pentland Road, Beinn Ghrideag and Creed would be decommissioned approximately 3-5 years prior to the end of the operation of the Proposed Development, reducing this cumulative effect. The nature of these effects would be long-term (reversible), cumulative, indirect and negative to neutral.

Table 6.19 Visual Effects on Views from National and Regional Recreational Routes within 35km

Receptor	Description of Effects
National and Regional Recreational Routes within 35km	
Sustrans Cycle Route 780	The Sustrans Cycle Route 780 extends from the Butt of Lewis in the north to Tarbert in the south on the Isle of Harris and is approximately 113km in length within the 35km Study Area. It is located approximately 3.3km southwest of the Proposed Development at its closest point. The route follows parts of the A857, A858 and A859 within the Study Area, and is illustrated by Viewpoints 21 (**Figure 6.43a-e**), and the A859 Sequential Viewpoints 1, 2 and 3 (**Figures 6.21b-c**). Assessment: Proposed Development ZTV coverage is relatively limited to approximately 24km of the 113km route within 35km. The greatest visibility from the route would be in the north near Barvas for approximately 2km (Viewpoint 21) and in the south between the A859 Sequential Viewpoints 2 and 3, for approximately 2km, where blades and blade tips (including some hubs) would be visible. The magnitude of change would range from Low to Low-Negligible at these locations. From the remainder of the route, there would be very limited visibility (blade tips) or no visibility of the Proposed Development (blade tips) where the magnitude would range from Negligible to Zero. Aviation warning lights would be limited to the section near Barvas in the north and between the A859 Sequential Viewpoints 2 and 3 in the south (not significant). The magnitude of change would range from Low to Zero and the effect would be Moderate to No View and not significant. The effect would not be significant due to the limited magnitude of change, screening provided by intervening landform and vegetation, large-scale of the receiving landscape, and transitory nature of the views. The nature of these effects would be long-term (reversible), indirect and negative to neutral. Cumulative Assessment: Proposed Development + Existing + Consented Sites The existing Baile an Truiseil, Horshader and Monan turbines would be visible in close proximity as the route passes north of Barvas, Dalmore and Bun Abhainn Eadarra (all High to Zero magnitude). The consented Muaitheabhal wind farms would be visible from parts of the route in the south (Medium-Low to Zero magnitude). The remaining existing and consented wind farms visible would be of Negligible magnitude due to intervening screening and distance. The cumulative magnitude of change of existing and consented wind farms would be High to Zero. The additional effect of the Proposed Development would remain Moderate to No View and not significant. The combined effect would be **Substantial to Substantial / Moderate** and **significant** (due to Baile an Truiseil, Horshader, Monan and Muaitheabhal and not the Proposed Development) to No View and not significant. The nature of these effects would be long-term (reversible), cumulative, indirect and negative to neutral.
Regional Recreational Routes within 35km	
Hebridean Way	The Hebridean Way is a long-distance walking or cycling route of approximately 252km in length that crosses the entire Outer Hebrides. It extends from the settlement of Stornoway to Tarbert on the Isle of Harris within 35km, following the A858 to Achamore, crossing over moorland tracks to the A859 at Laxay / Lacasaigh after which it roughly follows the road to the south. It is located approximately 142m from the Proposed Development at its closest point. The length of the route within 35km is approximately 110km and is illustrated by Viewpoint 1 (**Figure 6.24a-e**), Sequential Viewpoint 4 (**Figure 6.22c-d**) and a number of Residential Viewpoints in **Appendix 6C**. Assessment: Proposed Development ZTV coverage indicates that approximately 46km of the 110km of the route within the 35km study area has theoretical visibility of the Proposed Development. Theoretical visibility is almost continuous for approximately 11km between the settlements of Stornoway (Marybank) and north of Achamore, as illustrated in Viewpoint 1 and Sequential Viewpoint 4. The greatest visibility arises for approximately 8km between west of Marybank and south of viewpoint 1 (Loch nan Eilean) where the Proposed Development would be closest to the route (High magnitude). The existing turbines at Beinn Ghrideag and Pentland Road are also located in close proximity and clearly visible from this section of the route. Between Marybank and Lews Castle Grounds, visibility of the Proposed Development would vary due to built-form, vegetation and / or landform (High to Zero magnitude).

Receptor	Description of Effects
	From south of viewpoint 1 to north of Achamore, visibility of the Proposed Development would vary (Low magnitude) due to landform with no visibility from Achamore itself (Zero magnitude). Beyond Achamore to the south, visibility reduces remarkedly due to landform and limited to upper parts of the turbines to no views of the Proposed Development (Low to Zero magnitude). Aviation warning lights would be visible from the same sections of the route as described above, with the greatest visibility between Marybank and north of Achamore, where visible (**significant** within approximately 5km). The magnitude of change would range from High to Zero and the effect would be **Substantial** and **significant** (for 8km of the route between Marybank and Loch nan Eilean) to No View and not significant. The nature of these effects would be long-term (reversible), indirect and negative to neutral. <u>Cumulative Assessment: Proposed Development + Existing + Consented Sites</u> The existing Beinn Ghrideag, Pentland Road and Monan turbines would be clearly visible as the route passes in close proximity (all High to Zero magnitude). The consented Muaitheabhal Wind Farms would be visible from parts of the route in the south (Medium-Low to Zero magnitude). The remaining existing and consented wind farms visible would be of Negligible magnitude due to intervening screening and distance. The cumulative magnitude of change of existing and consented wind farms would be High to Zero. The additional effect of the Proposed Development would remain **Substantial** and **significant** to No View and not significant. The combined effect would be **Substantial** and Significant (due to the Proposed Development, Beinn Ghrideag, Pentland Road, Monan and Muaitheabhal) to No View and not significant. Unless consent is granted to extend their operation, Pentland Road and Beinn Ghrideag would be decommissioned ~3-5 years prior to the end of the operation of the Proposed Development, reducing this cumulative effect. The nature of these effects would be long-term (reversible), cumulative, indirect and negative to neutral.
Timeless Way	The Timeless Way is a long-distance walking route approximately 322km in length and crosses the Outer Hebrides from the Butt of Lewis to Vattersay. It extends from the Butt of Lewis in the north to Tarbert on the Isle of Harris within 35km. It is located approximately 142m from the Proposed Development at its closest point. The length of the route within 35km is approximately 150km and is illustrated by Viewpoints 17, 20, 22 and C (**Figures 6.40a-d, 6.42a-d, 6.44a-d** and **6E.3, Appendix 6E**), Sequential Viewpoints 2, 3 and 4 (**Figures 6.22 b-d**) and a number of Residential Viewpoints in **Appendix 6C**. <u>Assessment: Proposed Development</u> ZTV coverage indicates that approximately 44km of the 150km of the route within the 35km study area has theoretical visibility of the Proposed Development. Theoretical visibility is almost continuous for approximately 35km of the route, within 15km, that extends along Pentland Road, the A858 and B895 towards North Tolsta. However, visibility of the Proposed Development would vary along this route due to screening by intervening built-form, vegetation and / or landform. In particular, the greatest visibility of the Proposed Development would be for approximately 9km of the route between west of Marybank and half way up Pentland Road where the turbines would be clearly visible due to limited screening (High magnitude). The existing turbines at Beinn Ghrideag and Pentland Road are also located in close proximity and clearly visible from this section of the route. Beyond the western end of Pentland Road, through Calanis, the B8011 and to the south, visibility of the Proposed Development would reduce due to screening by intervening landform (Low to Zero magnitude), as illustrated by Viewpoints 17 and 20. Between Stornoway and North Tolsta, the route largely follows the B895 and visibility of the Proposed Development would vary with distance, as illustrated in Viewpoints 12, 22 and C (High-Medium to Zero magnitude) and would be most notable for approximately 7km of the route. There would be wide, open views from this section of route which are primarily focused towards the coastline and sea. Beyond North Tolsta, there would be very limited to no visibility of the Proposed Development (Negligible to Zero magnitude). Aviation warning lights would be visible from the same sections of the route as described above, with the greatest visibility between west of Marybank and Pentland Road, and between northeast of Stornoway and Coll (**significant** within approximately 5km). The magnitude of change would range from High to Zero and the effect would be **Substantial** and **significant** (between west of Marybank and Pentland Road, and between northeast of Stornoway and Coll) to No View and not significant. The nature of these effects would be long-term (reversible), indirect and negative to neutral. <u>Cumulative Assessment: Proposed Development + Existing + Consented Sites</u> The existing Beinn Ghrideag, Pentland Road, Horshader, Monan, North Tolsta turbines and the consented Druim Leathann Wind Farm would be clearly visible as the route passes in close proximity (all High to Zero magnitude). The remaining existing and consented wind farms visible would be of Negligible to Zero magnitude due to intervening screening and distance.

Receptor	Description of Effects
	The cumulative magnitude of change of existing and consented wind farms would be High to Zero. The additional effect of the Proposed Development would remain **Substantial** and **significant** to No View and not significant. The combined effect would be **Substantial** and **significant** (due to the Proposed Development, Beinn Ghrideag, Pentland Road, Horshader, Monan, North Tolsta and Druim Leathann) to No View and not significant. Unless consent is granted to extend their operation, Pentland Road and Beinn Ghrideag would be decommissioned ~3-5 years prior to the end of the operation of the Proposed Development, reducing this cumulative effect. The nature of these effects would be long-term (reversible), cumulative, indirect and negative to neutral.

Visual Effects on Views from Recreational and Tourist Destinations

6.8.57 The visual assessment has considered the potential visual effects likely to be experienced by people at recreational / visitor or tourist destinations or attractions within the Study Area. The assessment of recreational and tourist destinations is set out in **Table 6.20** and illustrated in **Figure 6.18**.

6.8.58 Each of these destinations was visited and the assessment was been assisted on site with the use of ZTVs, wirelines and True View Visuals 3D software.

6.8.59 In summary, **significant** visual effects would be experienced from three local tourist attractions or destinations within 15km of the Proposed Development as follows:

- Stornoway Golf Club / Lews Castle and Lady Lever Park GDL;
- Lewis War Memorial; and
- Iolaire Memorial.

6.8.60 In all cases, the Proposed Development would be seen within a large-scale, *Boggy Moorland* landscape setting, with characteristics that make it suitable for the accommodation of large wind farm development. During much of its operational period, the Proposed Development would be seen alongside or overlapping with other existing wind farms.

6.8.61 Whilst there would be **significant** visual effects, the visitor experience of visiting the Lewis War Memorial would be to view in the opposite direction, towards Stornoway, the Eye Peninsula and the coastline, and away from the Proposed Development. Similarly, the visitor experience of visiting the Iolaire Memorial would be to view in the direction of the ship wreck in the sea to the south, and away from the Proposed Development.

Table 6.20 Visual Effects on Views from Recreational and Tourist Destinations

Receptor	Description of Effects
Stornoway Golf Club / Lews Castle and Lady Lever Park GDL	Stornoway Golf Club is located within the boundary of Lews Castle and Lady Lever GDL in the north and is located approximately 2.2km east of the Proposed Development. The GDL (240Ha acres) is recorded in the Scottish Inventory for Gardens and Designed Landscape and is assessed as outstanding for five categories and high for two categories. It commands panoramic views and is prominent on the sea approach to Lewis. The Castle is situated mid-way on the east-facing, heavily wooded hillside and dominates views from Stornoway. Views from the Park overlook Stornoway, the inner harbour and town. Extensive views are obtained from the summit of Cnoc Croich across to Lews Castle, the island's hinterland and Glumlaig Harbour. Visibility from the GDL is illustrated by Viewpoint 4 (**Figure 6.27a-e**), located at the highest point of the Park. A network of core paths traverses the Park. The sensitivity of the GDL / Golf Club is assessed as *High* due to the High susceptibility visitors, whose attention is likely to be focused on the landscape and the High value of the GDL. Assessment: Proposed Development

Receptor	Description of Effects
	ZTV coverage is varied across the Golf Club and the Park due to the underlying topography and mature woodland, which slopes towards the east. As a consequence, ZTV coverage is continuous across the western portion of the Park with limited visibility to the north, east and southeast. Given the underlying topography, the main views from the Park are east towards the settlement of Stornoway and the sea. Conversely, westerly views towards the Proposed Development would be relatively screened by established woodland that is relatively prevalent throughout the Park. There would, however, be localised areas (i.e. more elevated vantage points / areas of lesser tree cover) from western and southern parts of the GDL where there would be more open views of the Proposed Development, as illustrated by Viewpoint 4 (High magnitude). The turbines would be visible in close proximity from these small sections of the route, however, the views would be wide and panoramic, and seen in the context of other existing man-made elements with the primary views remaining towards the settlement of Stornoway and the sea. From the remainder of Park, there would be very limited or no visibility of the Proposed Development (Negligible to Zero magnitude). Aviation warning lights would be visible from the same western and southern sections of the GDL as described above, however, they would be visible in the context of other light sources associated with the settlement of Stornoway, existing turbines and masts (Significant from elevated sections). The magnitude of change would range from High to Zero and the effect would be **Substantial** and **significant** (from more elevated sections of the GDL) to No View and not significant. The nature of these effects would be long-term (reversible), indirect and negative to neutral. <u>Cumulative Assessment: Proposed Development + Existing + Consented Sites</u> Creed, Beinn Ghrideag and Pentland Road (all Medium magnitude) would be visible from parts of the GDL to the west / northwest, with Beinn Ghrideag and Pentland Road appearing behind the proposed turbines. Arnish Moor would be further visible to the southwest (Medium to Low magnitude). Other existing and consented wind farms visible would be of Negligible magnitude due to intervening landform and distance. The cumulative magnitude of change of existing and consented wind farms would be Medium. The additional effect of the Proposed Development would remain **Substantial** and **significant** to No View and not significant. The combined effect would be **Substantial** and **significant** (due to the Proposed Development, Pentland Road, Beinn Ghrideag and Creed) to No View and not significant. Unless consent is granted to extend their operation, Pentland Road, Beinn Ghrideag and Creed would be decommissioned approximately 3-5 years prior to the end of the operation of the Proposed Development, reducing this cumulative effect. The nature of these effects would be long-term (reversible), cumulative, indirect and negative to neutral.
Lewis War Memorial	Assessed in detail in **Appendix 6B** and illustrated in Viewpoint 2 (**Figure 6.25a-e**). While the visitor experience of visiting the Lewis War Memorial would be to view in the opposite direction, towards Stornoway, the Eye Peninsula and the coastline, and away from the Proposed Development, the level of effect due to the Proposed Development would be **Substantial** and **significant**. The nature of these effects would be long-term (reversible), indirect, cumulative and negative to neutral.
Standing Stones of Calanais (Callanish)	Assessed in detail in **Appendix 6B** and illustrated in Viewpoint 17 (**Figure 6.40a-d**). In summary, the level of effect due to the Proposed Development would be Slight and not significant. The nature of these effects would be long-term (reversible), indirect, cumulative and negative to neutral.
Tiupman Head (Rubha an T-siumpain)	Tiupman Head is the most easterly point on the Eye Peninsula (An Rubha), approximately 18km distance, east of the Proposed Development. <u>Assessment: Proposed Development</u> ZTV coverage across this headland is limited to the south facing slopes of Tiupman Head Hill. The main visitor attraction is the lighthouse (from which there are no views of the Proposed Development – apart from at the very top of the lighthouse), and the coastal views to the north. There are no views from this part of the coastline (north of Tiumpan Head Hill) towards the Proposed Development. There would be some views from the picnic bench on the approach to the lighthouse and from the top of Tiumpan Head Hill (Low to Zero magnitude). Aviation warning lights would be visible from the picnic bench and from top of Tiumpan Head Hill (not significant). The magnitude of change would range from Low to Zero and the effect would be Moderate to No View and not significant. The effect would not be significant due to the limited magnitude, large-scale of the receiving landscape, presence of other man-made elements and distance from the receptor. The nature of these effects would be long-term (reversible), indirect and negative to neutral.

Receptor	Description of Effects
	Cumulative Assessment: Proposed Development + Existing + Consented Sites The existing and consented wind farms visible from parts of this settlement would range from Low-Negligible to Zero magnitude. The additional effect of the Proposed Development would remain Moderate to No View and not significant. The combined effect would be Moderate to No View and not significant. The nature of these effects would be long-term (reversible), cumulative, indirect and negative to neutral.
Iolaire Memorial	Assessed in detail in **Appendix 6B** and illustrated in Viewpoint 28 (**Figure 6.50a-f**). While the visitor experience of visiting the Iolaire Memorial would be to view in the direction of the ship wreck in the sea to the south, and away from the Proposed Development, the level of effect due to the Proposed Development would be **Substantial / Moderate** and **significant**. The nature of these effects would be long-term (reversible), indirect, cumulative and negative to neutral.
An Cliseam (Clisham)	Assessed in detail in **Appendix 6B** and illustrated in Viewpoint 17 (**Figure 6.45a-c**). In summary, the level of effect due to the Proposed Development would be Slight and not significant. The nature of these effects would be long-term (reversible), indirect, cumulative and negative to neutral.

Visual Effects on the view of Anglers

6.8.62 The visual assessment has considered the potential visual effects likely to be experienced by anglers at various water bodies and water courses within the Study Area.

6.8.63 The attention of anglers is likely to be focused on water bodies (rivers and lochs/lochans) and fishing rather than on the landscape and their sensitivity is assessed as Medium due to their Medium susceptibility to change.

6.8.64 The viewpoint analysis, in **Appendix 6B**, indicates that the **significant** visual effects would extend out to approximately 14km from the nearest turbine locations. However, the most notable effects would be out to approximately 6km from the Proposed Development where viewpoints 1, 2, 3, 4, 5, 6, 8, 9, 24, 25 and 26 indicate **significant** visual effects (High and High-Medium magnitude of change), experienced by receptors of High to Medium sensitivity.

6.8.65 On this basis, **significant** visual effects would also be experienced by anglers whilst fishing at those water bodies within approximately 6km from the Proposed Development, where there would be clear, uninterrupted views of the turbines. However, intervening landform, built-form and / or vegetation would reduce visibility in places, including the majority of Loch Luirbost to the south as well as several water bodies to the north and west, screened by the local summits of Beinn a' Sgridhe, Beinn Bhearnach, Beinn Mholach and Beinn Bharabhais, as well as Eitseal, Druim Ucsabhat and Stacaiseal. A number of water bodies are located within natural depressions in the landform which would further limit outwards views. Where there are more open views, the Proposed Development would be visible across open moorland and in the context of other man-made development including existing turbines (High to Zero magnitude).

6.8.66 Beyond 6km, visibility of the Proposed Development experienced by anglers would notably reduce from water bodies due to distance and intervening landform, vegetation and / or built-form (Medium to Medium / Low to Zero magnitude).

6.8.67 Aviation warning lights would be visible at periods of dusk and dawn in the context of other light sources from existing turbines, masts and houses. It is, however, acknowledged that there would be a very small number of anglers present during the hours of darkness.

6.8.68 The magnitude of change experienced by anglers would range from High to Zero and the level of effect would be **Substantial / Moderate to Moderate** and **significant** (within approximately 6km) to No View and not significant. The nature of these effects would be long-term (reversible), indirect and negative to neutral.

Cumulative Assessment: Proposed Development + Existing + Consented Sites

6.8.69 There would be a number of existing wind farms visible within 6km from water bodies and courses including Beinn Ghrideag, Pentland Road, Arnish Moor, Creed, and Bridge Cottages (High to Zero magnitude). Beyond 6km, other existing and consented wind farms would become more prominent including Horshader, Baile an Truseil, North Tolsta and Druim Lethann turbines in the north, and the consented Muaitheabhal Wind Farms in the south. The cumulative magnitude of change of existing and consented wind farms would be High to Zero. The additional effect of the Proposed Development would be **Substantial / Moderate to Moderate** and significant to No View and not significant. The combined effect would be **Substantial to Substantial / Moderate** and **significant** (due to the Proposed Development, and other existing and consented wind farms listed above) to No View and not significant. Unless consent is granted to extend their operation, Pentland Road, Beinn Ghrideag, Creed and Arnish Moor would be decommissioned approximately 3-10 years prior to the end of the operation of the Proposed Development, reducing this cumulative effect. The nature of these effects would be long-term (reversible), cumulative, indirect and negative to neutral.

6.9 Summary of Landscape, Visual and Cumulative Effects

6.9.1 A summary of the landscape, visual and cumulative effects are provided in **Tables 6.21-22**.

Interpretation of Summary Tables

6.9.2 The information set out in **Tables 6.21-22** lists the main receptors included in this assessment and provides a summary of the landscape and visual effects of the Proposed Development as well as the cumulative effects as follows:

- Level of Effect: Proposed Development:
  - Sensitivity: The sensitivity of the receptor (ranging from high, medium, low, and negligible) in accordance with the methodology in **Appendix 6A**;
  - Magnitude (Proposed Development only): The magnitude of change as a result of the Proposed Development; and
  - Level of Effect (Proposed Development only): The level of effect resulting from the Proposed Development, taking account of the sensitivity and magnitude in accordance with the methodology. Those levels of effect shown in bold relate to significant effects.
- Cumulative Level of Effect (including the additional and combined effects of the Proposed Development):
  - Magnitude (Existing and Consented Wind Farms): The magnitude of change, taking account of other existing and consented wind farms (ranging from high, medium, low, negligible, and zero) in accordance with the methodology; and
  - Cumulative Level of Effect: The level of effect, taking account of the other existing, consented / under construction and the Proposed Development, taking account of the sensitivity and magnitude. Those levels of effect shown in bold relate to significant effects, with the wind farm contributing most to the cumulative effects being noted in brackets.

wood.

Table 6.21 Summary of Landscape and Cumulative Effects

Receptor	Solus Assessment (Proposed Development) (up to 180m / 156m to blade tip)			Cumulative Assessment: Proposed Development (PD) and other wind farms		
	Sensitivity	**Magnitude**	**Level of Effect:**	**Magnitude** (Existing and Consented)	**Additional Level of Effect**	**Combined Level of Effect**
Landscape Effects on the host *Boggy Moorland (Boggy Moor 1)*						
Boggy Moorland (Boggy Moor 1) during Construction	Medium-Low	High to Zero	**Substantial / Moderate** (1-5km) to None	Cumulative effects would increase from None at the start of construction to the operational levels of **Substantial / Moderate** (due to the Proposed Development and other wind farms listed below).		
Boggy Moorland (Boggy Moor 1) during Operation	Medium-Low	High to Zero	**Substantial / Moderate** (1-5km) to None	High	**Substantial / Moderate to Moderate** (1-5km) to None	**Substantial / Moderate** (PD, Beinn Ghrideag, Pentland Road, Arnish Moor, Creed, Bridge Cottages, Baile an Truiseil, North Tolsta, Druim Leathann) to None
Boggy Moorland (Boggy Moor 1) during Decommissioning	Medium-Low	Low to Negligible	Slight / Negligible	All other wind farm operation would have ceased under the existing consents and the residual cumulative effects post decommissioning would be Slight / Negligible.		
Landscape Effects (Indirect) on surrounding Landscape Character within 15km						
Gently Sloping Crofting (Crofting 1)	Medium	High / High-Medium to Zero	**Substantial / Moderate** (2-3km) to None	High-Medium	**Substantial / Moderate** (2km) to None	**Substantial / Moderate** (2-3km) (PD and Bridge Cottages) to None
Boggy Moorland (Boggy Moor 2)	High-Medium	Low to Zero	Moderate / Slight to None	Low	Moderate / Slight to None	Moderate / Slight to None
Rocky Moorland – Outer Hebrides	High-Medium	Medium to Zero	**Substantial / Moderate** (3km) to None	High-Medium	Moderate to None	**Substantial to Substantial / Moderate** (3km) (PD, Arnish Moor and Creed) to None
Cnoc and Lochan	High	Medium to Zero	**Substantial / Moderate** (3km) to None	Medium	**Moderate** to None	**Substantial / Moderate** (3km) (PD and Arnish Moor) to None
Landscape Effects (Indirect) on surrounding Landscape Designations within 35km						
South Lewis, Harris and North Uist NSA	High	Low-Negligible	Moderate / Slight to None	High	Moderate / Slight to None	**Substantial to Substantial / Moderate** (2km) (Monan and Muaitheabhal) to None

Table 6.22 Summary of Visual and Cumulative Effects

Receptor	Solus Assessment (Proposed Development) (up to 180m / 156m to blade tip)			Cumulative Assessment: Proposed Development (PD) and other wind farms		
	Sensitivity	**Magnitude**	**Level of Effect:**	**Magnitude** (Existing and Consented)	**Additional Level of Effect**	**Combined Level of Effect**
Visual Effects on Settlements						
Stornoway Core Settlement	High	High-Medium to Zero	**Substantial to Substantial / Moderate** to No View	Medium-Low	**Substantial to Substantial / Moderate** to No View	**Substantial to Substantial / Moderate** to No View
Greater Stornoway Main Settlement						
Newmarket	High	High to Zero	**Substantial** to No View	Low	**Substantial** to No View	**Substantial** to No View
Newvalley (incl. Guershader / Laxdale)	High	High-Medium to Zero	**Substantial to Substantial / Moderate** (Newvalley) to No View	Medium-Low	**Substantial to Substantial / Moderate** (Newvalley) to No View	**Substantial to Substantial / Moderate** (Newvalley) to No View
Marybank	High	High / High-Medium to Zero	**Substantial to Substantial / Moderate** to No View	Low - Zero	**Substantial to Substantial / Moderate** to No View	**Substantial to Substantial / Moderate** to No View
Maryhill	High	High to Zero	**Substantial** to No View	Medium-Low to Zero	**Substantial** to No View	**Substantial** to No View
Liurbost, Crosbost and Ranais						
Liurbost and Crosbost	High	Negligible to Zero	Slight to No View	Negligible	Slight to No View	Slight to No View
Ranais	High	Medium to Zero	**Substantial / Moderate** to No View	Low	**Substantial / Moderate** to No View	**Substantial / Moderate** to No View
Tong (Tunga) (including Aird Tong (Aird Thunga))	High	High-Medium to Zero	**Substantial to Substantial / Moderate** to No View	Low - Zero	**Substantial to Substantial / Moderate** to No View	**Substantial to Substantial / Moderate** to No View
Grimshader (Griomsidar) (including Ceann Hurnavay)	High	Low to Zero	Moderate to No View	Low - Zero	Moderate to No View	Moderate to No View
Greater Stornoway Main Settlement – East (including Steinis, Sanndabhaig, Park End), Tolm and Mealabost)	High	High-Medium to Zero	**Substantial to Substantial / Moderate** (Steinis, Sanndabhaig, Lower Sandwick and Mealabost) to No View	Low - Zero	**Substantial to Substantial / Moderate** (Steinis, Sanndabhaig, Lower Sandwick and Mealabost) to No View	**Substantial to Substantial / Moderate** (Steinis, Sanndabhaig, Lower Sandwick and Mealabost) to No View

Receptor	Solus Assessment (Proposed Development) (up to 180m / 156m to blade tip)			Cumulative Assessment: Proposed Development (PD) and other wind farms		
	Sensitivity	**Magnitude**	**Level of Effect:**	**Magnitude** (Existing and Consented)	**Additional Level of Effect**	**Combined Level of Effect**
Coll (Col) (including Col Uarach, Cnoc an t-Solais, Back and Griais)	High	Medium-Low to Zero	**Substantial / Moderate to Moderate** to No View	Low - Zero	**Substantial / Moderate to Moderate** to No View	**Substantial / Moderate to Moderate** to No View
Cromore (Cromor)	High	Low to Zero	Moderate to No View	Low	Moderate to No View	Moderate to No View
Knock (An Cnoc) (including Suardail and Aiginis) (on the Eye Peninsula / An Rubha)	High	Medium to Zero	**Substantial / Moderate** to No View	Low - Zero	**Substantial / Moderate** to No View	**Substantial / Moderate** to No View
Gearraidh Bhaird (Garyvard), Kershader and Tabost						
Gerraidh Bhaird (Garyvard)	High	Medium-Low to Zero	**Substantial / Moderate** to No View	Low - Zero	**Substantial / Moderate** to No View	**Substantial / Moderate** to No View
Kershader and Tabost	High	Low to Zero	Moderate to No View	Low-Negligible to Zero	Moderate to No View	Moderate to No View
Garrabost / Upper Garrabost (on the Eye Peninsula / An Rubha)	High	Medium to Zero	**Substantial / Moderate** (Upper Garrabost) to No View	Low - Zero	**Substantial / Moderate** (Upper Garrabost) to No View	**Substantial / Moderate** (Upper Garrabost) to No View
Marvig (Marbhig)	High	Low to Zero	Moderate to No View	Negligible - Zero	Moderate to No View	Moderate to No View
Lower Bayble (Pabail Iarach) and Upper Bayble (Pabail Uarach) (on the Eye Peninsula / An Rubha)	High	Low to Zero	Moderate to No View	Negligible - Zero	Moderate to No View	Moderate to No View
Barvas (Barabhas)	High	Low to Zero	Moderate to No View	High	Moderate to No View	**Substantial** (Upper Barvas) (Baile an Truiseil) to No View
Shulishader (Sulaisaidar) (on the Eye Peninsula / An Rubha)	High	Medium-Low to Zero	**Substantial / Moderate** to No View	Low - Zero	**Substantial / Moderate** to No View	**Substantial / Moderate** to No View
Brue (Bru), Arnol and Bragar (including Labost)	High	Negligible to Zero	Slight to No View	Low	Slight to No View	Slight to No View
Visual Effects on Transport Routes						
A858	High-Medium	High to Zero	**Substantial to Substantial / Moderate** to No View	High	**Substantial to Substantial / Moderate** to No View	**Substantial to Substantial / Moderate** to No View (PD, Beinn Ghrideag, Pentland Road)

Receptor	Solus Assessment (Proposed Development) (up to 180m / 156m to blade tip)			Cumulative Assessment: Proposed Development (PD) and other wind farms		
	Sensitivity	**Magnitude**	**Level of Effect:**	**Magnitude** (Existing and Consented)	**Additional Level of Effect**	**Combined Level of Effect**
A859	Medium	High to Zero	**Substantial / Moderate to Moderate** to No View	High	**Substantial / Moderate to Moderate** to No View	**Substantial / Moderate** to No View (PD, Creed, Arnish Moor)
A857	Medium	Medium to Zero	Moderate to No View	High	Moderate to No View	**Substantial / Moderate** to No View (Baile an Truiseil, Bridge Cottages)
A866	Medium	High-Medium to Zero	**Substantial / Moderate** to No View	Medium-Low	**Substantial / Moderate** to No View	**Substantial / Moderate** to No View
B897	Medium	High-Medium to Zero	**Substantial / Moderate** to No View	High	**Substantial / Moderate** to No View	**Substantial / Moderate** to No View (PD, Arnish Moor)
B895	High-Medium	High-Medium to Zero	**Substantial to Substantial / Moderate** to No View	High	**Substantial to Substantial / Moderate** to No View	**Substantial to Substantial / Moderate** to No View (PD, North Tolsta, Druim Leathann)
B8060	Medium	Medium-Low to Zero	Moderate to Moderate / Slight to No View	Low	Moderate to Moderate / Slight to No View	Moderate to Moderate / Slight to No View
Pentland Road	High-Medium	High to Zero	**Substantial to Substantial / Moderate** to No View	High	**Substantial to Substantial / Moderate** to No View	**Substantial to Substantial / Moderate** to No View (PD, Beinn Ghrideag, Pentland Road)
Stornoway – Ullapool Ferry Route	High-Medium	High-Medium to Negligible	**Substantial / Moderate** to Negligible	Low	**Substantial / Moderate** to Negligible	**Substantial / Moderate** to Negligible
Visual Effects on Recreational Routes: Local Routes within 15km						
Core Path 6	High	High to Zero	**Substantial** to No View	Medium	**Substantial** to No View	**Substantial** to No View (PD, Beinn Ghrideag, Pentland Road, Creed)
Visual Effects on Recreational Routes: National and Regional Routes within 35km						

Receptor	Solus Assessment (Proposed Development) (up to 180m / 156m to blade tip)			Cumulative Assessment: Proposed Development (PD) and other wind farms		
	Sensitivity	**Magnitude**	**Level of Effect:**	**Magnitude** (Existing and Consented)	**Additional Level of Effect**	**Combined Level of Effect**
Sustrans Cycle Route 780	High	Low to Zero	Moderate to No View	High	Moderate to No View	**Substantial to Substantial / Moderate** to No View (Baile an Truiseil, Horshader, Monan and Muaitheabhal)
Hebridean Way	High	High to Zero	**Substantial** to No View	High	**Substantial** to No View	**Substantial** to No View (PD, Beinn Ghrideag, Pentland Road, Monan, Muaitheabhal)
Timeless Way	High	High to Zero	**Substantial** to No View	High	**Substantial** to No View	**Substantial** to No View (PD, Beinn Ghrideag, Pentland Road, Monan, Horshader, North Tolsta, Druim Leathann)
Visual Effects on Recreational and Tourist Destinations within 35km						
Stornoway Golf Club / Lews Castle and Lady Lever Park GDL	High	High to Zero	**Substantial** to No View	Medium- Low	**Substantial** to No View	**Substantial** to No View (PD, Beinn Ghrideag, Pentland Road, Creed)
Lewis War Memorial	High	High	**Substantial**	Medium	**Substantial**	**Substantial** (PD, Beinn Ghrideag, Pentland Road)
Standing Stones of Calanais (Callanish)	High	Negligible	Slight	Low to Negligible	Slight	Moderate to Slight (Pentland Road)
Tiupman Head (Rubha an T-siumpain)	High	Low	Moderate	Low to Negligible	Moderate	Moderate
Iolaire Memorial	High	Medium	**Substantial / Moderate**	Low	**Substantial / Moderate**	**Substantial / Moderate**
An Clisheam (Clisham)	High	Negligible	Slight	Low	Slight	Moderate (Muaitheabhal)
Visual Effects on Anglers						

Receptor	Solus Assessment (Proposed Development) (up to 180m / 156m to blade tip)			Cumulative Assessment: Proposed Development (PD) and other wind farms		
	Sensitivity	**Magnitude**	**Level of Effect:**	**Magnitude** (Existing and Consented)	**Additional Level of Effect**	**Combined Level of Effect**
Anglers	Medium	High to Zero	**Substantial / Moderate** (6km) to No View	High	**Substantial / Moderate** (6km) to No View	**Substantial to Substantial / Moderate** to No View (PD, Beinn Ghrideag, Pentland Road, Arnish Moor, Creed, and Bridge Cottages)

6.10 Summary and Conclusion

6.10.1 The LVIA has been undertaken in accordance with GLVIA 3 by chartered landscape architects at Wood. The assessment process has encompassed the construction, operational and decommissioning phases of the Proposed Development and has included design iteration and assessment of the residual effects.

6.10.2 The Development Site is located to the west of Stornoway on the Isle of Lewis and is set within an area of *Boggy Moorland* landscape character. The Proposed Development comprises 35 wind turbines, with ten turbines with a maximum height of up to 156m to blade tip in the east and the remaining 25 turbines with a maximum height of up to 180m to blade tip.

6.10.3 Infrastructure associated with the Proposed Development includes four site entrances (two main entry points from the A859 and two from the A858), internal access tracks and hardstanding areas, crane pads, up to five borrow pits, one temporary construction compound (including three smaller satellite compounds), and grid connection infrastructure (including up to three substations – one main control building with battery storage facilities and two smaller secondary substations).

Consultation

6.10.4 Consultation has been undertaken with SNH and CnES who commented on aspects of methodology, sources of information, scope of assessment, viewpoint assessment and cumulative development.

Design Principles and Evolution

6.10.5 The design of the Proposed Development commenced with the Consented Development infrastructure layout and evolved with the aim of utilising larger higher power output turbines that reflected the latest technological advances in their manufacture and design.

6.10.6 The landscape design principles and evolution from the Consented Development have been reviewed against the current SNH and Capacity Study guidance, further advice from CnES and SNH, and have been considered in developing the design of the Proposed Development as follows:

- The design process has sought to create a simple and cohesive wind farm composition within the *Boggy Moorland (Boggy Moor 1) LCT* either on a solus basis or cumulatively, taking account of the existing and consented wind farm development;
- The design of the Proposed Development has taken into account the location siting and capacity of the Boggy Moorland as described in the SNH Capacity Study. It is acknowledged that this large-scale landscape can accommodate large turbines;
- Consideration has been given to overall turbine height with regards to key visual receptors, with the design development comprising a multiple height option;
- With the exception of within the north-western part of the Development Site (due to reduced number of surrounding receptors and other constraints), the turbine layout has been largely contained within the currently consented turbine area, with proposed turbines set-back as far as practical from the outer edge of Greater Stornoway;
- A 1,800m set back from residential properties has been achieved which is greater than the minimum 1,500m set back of the consented turbines;
- The vertical and horizontal scale of the turbines is compatible with the scale of the landscape;

- The turbine heights of T7, T15, T16, T19, T20, T21, T29, T30, T33, T34 have been limited to a maximum of 156m to blade tip (as compared to 180m to blade tip for the remainder), located in the east of the Development Site, to reduce their impact when viewed from Stornoway (including Greater Stornoway) and other receptors in the east and northeast;
- The Proposed Development has continued to maintain very limited visual effects from the Standing Stones of Calanais visitor attraction; and
- The Proposed Development has avoided significant effects on the landscape character and the special qualities of the South Lewis, Harris and North Uist NSA.

6.10.7 An initial concept layout (33 turbines) was examined with a combination of a maximum of 155m and 187m to blade tip. This initial concept was the subject of the request for a scoping opinion and was examined by all technical and environmental disciplines involved with the EIA. This was followed by the creation, exploration and analysis of a series of iterative layouts responding to a range of technical and environmental constraints which were a key consideration for the design of the Proposed Development.

6.10.8 The various design layouts have sought to achieve the landscape design principles and mitigate significant landscape and visual effects as far as possible. This aspect of the design was judged via a panel of three chartered landscape architects, familiar with wind farm design.

6.10.9 A range of turbine blade tip heights were considered (145m, 150m, 155m, 156m, 175m, 180m, 187m, 200m and 220m) and the corresponding turbine spacing was increased to allow for a greater wake separation requirement resulting in a range of options based on layouts of between 14 and 43 turbines, spread across the Development Site.

6.10.10 The design evolution therefore has taken account of the pattern of development, the landscape capacity and the quality and aesthetics of the design of the Proposed Development. The assessment results indicate that the significant threshold of landscape (5km) and visual approximately 14km) effects would be the same in comparison to the Consented Development (as varied in 2016).

Mitigation and Enhancement Measures

6.10.11 All of the mitigation related to landscape, visual and cumulative effects is 'built-in' or embedded into the design of the Proposed Development and no additional mitigation or enhancement is proposed. This includes works related to the site infrastructure and the new areas of plantation forestry.

6.10.12 No mitigating alternative is currently available for aviation warning lights on turbines ≥150m in height to blade tip.

6.10.13 Opportunities for enhancement would be provided by use of the on-site wind farm tracks, by walkers and cyclists, as a recreational route.

Baseline Pattern of Wind Farm Development

6.10.14 There are five other existing wind farm developments within 10km of the Proposed Development and these include the Beinn Ghrideag Wind Farm (three turbines), Pentland Road Wind Farm (six turbines), Arnish Moor Wind Farm (three turbines), Creed single turbine and Bridge Cottages single turbine. A further five wind farms are located within 10-20km at Horshader, Baile an Truiseil and North Tolsta (all existing), and Druim Leathann and Muaitheabhal (both consented). The existing and consented wind farm development is largely located within Boggy *Moorland (Boggy Moor 1 and 2)*, *Rocky Moorland* and *Mountain Massif LCTs*. Part of the Muaitheabhal Wind Farms are located in a Wild Land Area over 20km south of the Proposed Development.

Cumulative Landscape Effects

6.10.15 Landscape effects are concerned with how the Proposed Development would affect the elements that make up the landscape, its characteristics, including perceptual aspects of the landscape, and its distinctive character.

6.10.16 The Proposed Development would be located within an extensive area of *Boggy Moorland* (*Boggy Moor 1*). The SNH Capacity Study describes the landscape as essentially simple, flat, open and large-scale which could accommodate an extensive wind farm development. It is to be noted that the SNH Capacity Study is slightly outdated considering advanced technology of turbines greater than 120m to tip height, and the change in baseline cumulative situation since the publication of the study. However, the principles of the capacity study remain and are considered to apply to this assessment.

6.10.17 Overall, the Proposed Development would result in a **significant** effect on the landscape character (affecting an area within 1km from each turbine and up to 2-3km in the east and southeast, 3km in the north and south, and 5km in the west) to the southeast of the *Boggy Moorland - Boggy Moor 1 LCT*, affecting the areas of the Development Site and the immediately adjacent areas. This amounts to approximately 15% of the total area of the host *Boggy Moor 1* LCT in northern Lewis (the percentage would be further reduced when accounting for all of the areas of *Boggy Moor 1* on the Isle of Lewis). There would be no significant effects on other areas of the *Boggy Moorland - Boggy Moor 1 LCT* on the Isle of Lewis. As a consequence, the effects on the *Boggy Moorland - Boggy Moor 1 LCT* as a whole would be not significant in overall terms. In practice, **significant** effects within the host area of the *Boggy Moorland - Boggy Moor 1* LCT would occur in the context of other wind farm development in this area and overlap with the cumulative effects of the adjacent Beinn Ghrideag, Pentland Road, Arnish Moor, Creed and Bridge Cottages Wind Farms which already have a significant characterising effect on this area.

6.10.18 The combined cumulative effect of the existing (and consented) and the Proposed Development on the *Boggy Moorland - Boggy Moor 1* would be **significant**, as a result of all of the wind farm development in this area. The nature of these effects would be cumulative, long-term (reversible), direct and negative.

6.10.19 With regards to other LCTs within 15km of the Development Site, there be localised **significant** effects on small areas of three LCTs including *Gently Sloping Crofting (Crofting 1)* – on the western fringes of the LCT (Greater Stornoway) within 2-3km of the Proposed Development; *Rocky Moorland* – on the northwestern fringes of one area of LCT within 3km of the Proposed Development; and *Cnoc and Lochan* – on the northern fringes of one area of LCT within 3km of the Proposed Development. The majority of these three LCTs and all remaining LCTs within 15km of the Development Site would not be significantly affected by the Proposed Development.

6.10.20 The duration of these cumulative effects would continue unchanged over the first half of the operational period for the Proposed Development. During the latter half of this period, existing and consented wind farms would reach the end of their operational period. These wind farms would be decommissioned, resulting in a gradual reduction in cumulative effects over this latter period.

6.10.21 There would be no significant cumulative effect on the landscape character and the special qualities or integrity of the South Lewis, Harris and North Uist NSA.

Cumulative Visual Assessment

6.10.22 Visual assessment is concerned wholly with the effects on views and the general visual amenity as a result of development. Visual effects are identified for different receptors (people) who would experience the view at their places of residence, during recreational activities, at work, or when travelling through the landscape.

Viewpoint Analysis

6.10.23 The viewpoint analysis indicates that the **significant** visual effects would extend out to approximately 14km from the nearest turbine locations as indicated by Viewpoints 1-6, 8-12, 14, 15, 18 and 24-28.

6.10.24 The threshold of approximately 14km from the Proposed Development could be subdivided into two areas. The first is an area of up to approximately 6km from the Proposed Development where viewpoints 1, 2, 3, 4, 5, 6, 8, 9, 24, 25 and 26 indicate **significant** visual effects (High and High-Medium magnitude of change), experienced by receptors of High to Medium sensitivity. The second area is between approximately 6-14km from the Proposed Development where viewpoints 10, 11, 12, 14, 15, 18, 27 and 28 indicate **significant** visual effects (Medium to Medium-Low magnitude of change), experienced by receptors of High sensitivity (mainly areas of settlement and one minor road of Medium sensitivity).

6.10.25 The night-time assessment (**Appendix 6D**) indicates that the potential for **significant** effects to occur as a result of aviation warning lights would be contained within approximately 10km from the proposed turbine locations.

6.10.26 The Proposed Development has also been considered in terms of the combined or cumulative visual effects with other existing and consented wind energy developments. The analysis indicates that further **significant** visual effects occur across the Study Area in respect of other wind farm development, particularly where a viewpoint is within close proximity to another development (viewpoints 21 and 22). However, it is important to note that the Proposed Development, where visible, ceases to make a significant contribution to cumulative visual effects beyond approximately 14.1km from the nearest turbines as indicated by Viewpoint 18. Beyond this distance, either other wind farms become more visible, or the cumulative visual effects of other wind farm developments including Proposed Development are not significant. Significant cumulative visual effects where the Proposed Development contributes to the views include the same viewpoints described in **Section 6.10.25**. However, other wind farms including Pentland Road, Beinn Ghrideag and Creed also add to significant cumulative visual effects at some of these locations.

Visual Effects on Views from Settlements and Residential Properties

6.10.27 There are a number of settlements within 15km of the Proposed Development that are overlapped by the blade tip ZTV. Effects on views from parts of the following settlements would be **significant** (Substantial to Substantial / Moderate):

- Stornoway Core Settlement;
- Greater Stornoway Main Settlement - North (incl. Newmarket, Newvalley, Marybank and Maryhill);
- Ranais;
- Tong (Tunga) (including Aird Tong (Aird Thunga));
- Greater Stornoway Main Settlement – East (including Steinis, Sanndabhaig) and Mealabost;
- Coll (Col) and Col Uarach;
- Knock (An Cnoc) (including Suardail and Aiginis) (on the Eye Peninsula / An Rubha);
- Gerraidh Bhaird (Garyvard);

- Upper Garrabost (on the Eye Peninsula / An Rubha); and
- Shulishader (Sulaisaidar) (on the Eye Peninsula / An Rubha).

6.10.28 The remaining settlements within 15km with theoretical visibility would not be significantly affected by the Proposed Development.

Residential Visual Amenity Assessment

6.10.29 A RVAA is reported in **Appendix 6C** and is illustrated in **Figures 6C.1a/b** and wirelines in **Figures 6C.2-14**. None of the properties included in the RVAA would be affected in terms of their residential visual amenity (the Proposed Development would not have an overbearing effect or otherwise affect the living standards of individual properties such that any of these would become an unattractive place to live (as opposed to less attractive) when judged objectively, and in the public interest).

Visual Effects on Views from Transport and Recreational Routes and Tourist Destinations

6.10.30 Significant visual effects would be experienced from parts of seven transport routes, three recreational routes and three visitor destinations, all within 15km of the Proposed Development, as follows:

- A858 (between Marybank and Loch nan Eilean);
- A859 (between Creed Bridge and north of Liurbost);
- A866 (parts of the route between Oliver's Brae and Shulishader);
- Stornoway – Ullapool Ferry Route (between south of Melbost to within Cala Steornabhaig (before approaching the ferry terminal);
- B897 (between the junction of the A859 and junction of the road to Grimshader);
- B895 (between south of Tong and Coll);
- Pentland Road (between Loch an Tobair and the road junction with the A858);
- Parts of Core Path 6 (from western and southern parts of the route);
- Parts of Hebridean Way (between Marybank and Loch nan Eilean);
- Parts of Timeless Way (between west of Marybank and Pentland Road, and between northeast of Stornoway and Coll);
- Stornoway Golf Club / Lews Castle and Lady Lever Park GDL (elevated sections);
- Lewis War Memorial; and
- Iolaire Memorial.

6.10.31 In all cases, the Proposed Development would be seen within a large-scale, *Boggy Moorland* landscape setting, with characteristics that make it suitable for the accommodation of largescale wind farm development. During much of its operational period (except within the last 5-10 years), the Proposed Development would be seen alongside or overlapping with other existing wind farms.

6.10.32 Whilst there would be **significant** visual effects, the visitor experience of visiting the Lewis War Memorial would be to view in the opposite direction, towards Stornoway, the Eye Peninsula and the coastline, and away from the Proposed Development. Similarly, the visitor experience of visiting the

Iolaire Memorial would be to view in the direction of the ship wreck in the sea to the south, and away from the Proposed Development.

6.10.33 Other transport routes, recreational routes and visitor destinations would not be significantly affected by the Proposed Development.

Visual Effects on Anglers

6.10.34 **Significant** visual effects would be experienced by anglers whilst fishing at those water bodies and courses within approximately 6km from the Proposed Development, where there would be clear, uninterrupted views of the turbines. However, intervening landform, built-form and / or vegetation would reduce visibility in places, including the majority of Loch Luirbost to the south as well as several water bodies to the north and west, screened by the local summits of Beinn a' Sgridhe, Beinn Bhearnach, Beinn Mholach and Beinn Bharabhais, as well as Eitseal, Druim Ucsabhat and Stacaiseal. Where there are more open views, the Proposed Development would be visible across open moorland and in the context of other man-made development including existing turbines. There would be no significant visual effects on anglers beyond 6km of the Proposed Development.

6.10.35 Aviation warning lights would be visible at periods of dusk and dawn in the context of other light sources from existing turbines, masts and houses, though it is expected that there would be very few anglers present during the hours of darkness.

Night-time Assessment on Aviation Warning Lights

6.10.36 Aviation warning lights would be required for all 35 turbines of the Proposed Development with one light positioned on each of the turbine nacelles and three further lights positioned on three sides of the tower at its mid-point. No mitigating alternative is currently available for the proposed aviation warning lights within the UK.

6.10.37 The threshold for significant visual effects resulting from aviation warning lights would be restricted to areas within approximately 10km, with the most distant night-time visual effects experienced from the Eye Peninsula to the east. The night-time visual effects would be mitigated by the higher volumes of existing lighting in and around Stornoway, and from more distant views by intervening topography. Within 10km, **significant** visual effects would result from the greater volume and extent of proposed aviation warning lights in comparison to the existing baseline, particularly where the existing landscape is either 'dark' or has low levels of existing lighting (Viewpoint N3 and N11). In views from the east and the Eye Peninsula, the proposed aviation warning lights also have the potential to look 'elevated' appearing above much of the ground-based lighting visible in the baseline when viewed in the context of more well-lit areas (Viewpoint N14).

6.10.38 To conclude, there would be a **significant** effect on the night-time character of the *Boggy Moor 1* LCT within 3-5km of the Proposed Development. This landscape is currently affected by the lights from four existing wind energy developments, the Eitseal transmission mast and the numerous lights at Stornoway and environs that result from industry / business and commercial lighting, residential lights and street lighting, Stornoway Airport, and the main roads and mobile lighting associated with different modes of transport (road traffic, ferries and aircraft). The *Boggy Moor 1* LCT is not currently valued (in terms of designation or tourist / visitor guides) and its 'partly lit' night-time character is markedly different to the 'dark' night-time character of the *Boggy Moor 1* LCT which occurs in most other areas of the Isle of Lewis. No other areas of landscape character or the South Lewis, Harris and North Uist NSA would be significantly affected by lighting from the Proposed Development during the construction, operation or decommissioning periods.

6.10.39 **Significant** night-time visual effects would affect the views from the following receptor locations:

- Elevated areas of the Stornoway Core Settlement, Greater Stornoway Main Settlement including elevated areas of the Stornoway Golf Club, Gallows Hill in the Lews Castle / Lady Lever Park GDL and the Lewis War Memorial;
- Stornoway East and the Iolaire Memorial;
- The western part of the Eye Peninsula including the settlements of An Cnoc and views from the A866 and ferry route within approximately 10km; and
- Part of the routes of the A859, A857, B897 and the Hebridean Way and Timeless Way long distance recreational routes (overlapping with the A858 and Pentland Road) within 5km of the Proposed Development.

6.10.40 All of these visual effects would be experienced in the context of existing light sources at Stornoway, the Eitseal transmission mast and four existing wind energy developments within this same area.

6.10.41 There would be no significant night-time visual effects on views from the majority of Stornoway Core Settlement, much of the Lews Castle / Lady Lever Park GDL and no visibility of proposed aviation warning lights from the Standing Stones of Calanais.

Conclusions

6.10.42 The Proposed Development would be located within an undesignated area of the *Boggy Moorland (Boggy Moor 1)* LCT which is simple, open and large-scale, and is the least sensitive LCT with the highest capacity for large wind farm development in the Outer Hebrides. The suitability in principle and ability to accommodate large wind farm development has been confirmed through the approval of the Consented Development.

6.10.43 The design of the Proposed Development has broadly maintained the geographical footprint of the Consented Development (with the exception of the northwestern part of the Development Site) with adjustments to the site layout, number, location and height of turbines. The presence of other existing and consented wind farms within this landscape acts as both a constraint and an opportunity, reducing sensitivity as this is already a landscape with wind farms and other man-made development. For these reasons, the Proposed Development would not appear incongruous and would fit within this open, large-scale landscape.

6.10.44 The majority of **significant** effects as a result of the Proposed Development would be contained within the *Boggy Moorland* with small areas of **significant** effects on *Gently Sloping Crofting, Rocky Moorland and Cnoc and Lochan* LCTs, all within 5km.

6.10.45 There would be no significant effect on landscape planning designations, including the South Lewis, Harris and North Uist NSA.

6.10.46 **Significant** effects on views would arise in respect of parts of ten settlements, seven transport routes, three regional and local recreational routes, three visitor destinations, all contained within ~14km of the Proposed Development. The most notable effects would be within 6km of the Proposed Development (where the magnitude of change would range from High to High-Medium, experienced by receptors of High to Medium sensitivity), albeit **significant** visual effects would extend out to ~14km in some cases, where there are elevated, open views (experienced by receptors of High sensitivity, mainly in areas of settlement and one minor road of Medium sensitivity) due to the relatively open landscape and intermittent screening.

6.10.47 The Proposed Development would not have an overbearing effect or otherwise affect the living standards of individual properties such that any of these would become an unattractive place to live and therefore none of the residential properties would be affected in terms of their residential visual amenity.

6.10.48 **Significant** night-time landscape effects would occur on the host *Boggy Moor 1* LCT within approximately 5km of the proposed turbines. This landscape is currently affected by the lights from four existing wind energy developments, the Eitseal transmission mast and the numerous lights at Stornoway and environs that result from industry / business and commercial lighting, residential lights and street lighting, Stornoway Airport, and the main roads and mobile lighting associated with different modes of transport (road traffic, ferries and aircraft).

6.10.49 **Significant** night-time visual effects would be restricted to areas within ~10km of the proposed turbines and would include parts of four settlements, seven transport routes, two regional recreational routes and three visitor destinations. All of these visual effects would be experienced in the context of existing light sources at Stornoway, the Eitseal transmission mast and four existing wind energy developments within this same area.

6.10.50 The Proposed Development would be frequently viewed alongside the existing Beinn Ghrideag and Pentland Road Wind Farms due their close proximity, and with the existing Arnish Moor and Creed turbines in some views. However, cumulative effects with consented developments would be unlikely due to their geographic and spatial separation.

6.10.51 Over the operational period of the Proposed Development, the baseline of existing and consented wind farms would be decommissioned and consequently, the Proposed Development has been designed to fit with the *Boggy Moorland* on a solus basis as well as cumulatively. The design has taken account of guidance from SNH and CnES to enhance the visual composition of the turbines which would be set against a simple and broad scale *Boggy Moorland* landscape; a landscape that is well suited to the accommodation of large wind farm developments.

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7. Historic Environment

Non-Technical Summary

The Historic Environment chapter considers the likely significant effects on archaeology and built heritage interests (heritage assets) from the construction and operation of the Proposed Development. The assessment has taken into account comments and information provided by Historic Environment Scotland (HES) and CnES.

The assessment was designed to identify and record any historic features present within the Development Site through examination of desk-based sources and a detailed site walkover, and to identify any heritage assets within the surrounding area that could have their settings affected by the Proposed Development.

There is a potential for as yet undetected buried archaeological remains to survive within the Development Site, which could be impacted by the construction of the Proposed Development. However, taking into account the limited extent of the ground disturbance by element of the Proposed Development, any effects would be limited and could be effectively mitigated by the implementation of an agreed scheme of archaeological work.

The Proposed Development has been designed to avoid where possible all significant archaeological remains. No significant direct effects are predicted on any of the historic features; however, a non significant direct effect would occur on a group of shieling huts (MWE146816) close to turbines T29 and T30 and a head-dyke (MWE145731) and peat cuttings associated with the former Lewis Chemical Works (MWE4325) at the site entrance. These effects can be mitigated through an agreement of a written scheme of archaeological works.

The iterative design process has been used to ensure that the effects of the Proposed Development on heritage assets has been minimised through maximising the effect of existing landscape screening and separation from heritage assets and by presenting a more compact and coherent appearance for the Proposed Development in views where it would be visible. Significant adverse effects have been identified on the Scheduled Stone Circle at Druim Dubh and the Category B listed Stornoway War Memorial. All other effects arising through change to setting would be non-significant.

7.1 Introduction

7.1.1 This chapter of the EIA Report assesses the likely significant effects of the Proposed Development with respect to the Historic Environment. The chapter should be read in conjunction with the development description provided in **Chapter 4: Project Description** and with respect to relevant parts of other chapters (**Chapter 6 LVIA**), where common receptors have been considered and where there is an overlap or relationship between the assessment of effects.

7.2 Limitations of this Assessment

7.2.1 Certain historic environment assets discussed in this chapter were not visited directly owing to the absence of safe access or uncertainty of permitted access to land. Key assets where this was the case are listed below:

- Gress Lodge, Category B-listed building;
- Gress Lodge Souterrain, Scheduled Monument;

- Carn a'Mharc chambered cairn, Scheduled Monument;
- Caisteal Fleisirin (An Rubha), Scheduled Monument;
- Loch an Duin, (An Rubha), Scheduled Monument;
- Airidh nam Bidearan (Calanais Group), Scheduled Monument;
- Bragar horizontal watermills, Scheduled Monument.

7.2.2 In producing the assessments for these sites, reference has been made to predicted ZTVs)and wireframe views, aerial photography and ordnance survey mapping (See **Figures 6.2-6.5, 7.4** and **7.5)**. Where possible, site visits were undertaken to viewpoints where the asset was visible and from where views of the Proposed Development could be compared to those available from these assets. These limitations are not considered to affect the robustness of the assessment. The assessments presented below note any specific considerations that these access restrictions presented when assessing the potential effects of the Proposed Development.

7.3 Relevant Legislation, Planning Policy, Technical Guidance

Legislative Context

7.3.1 Certain assets that are deemed to be of particular importance are given legal protection. The importance of heritage assets and the protection of these and their settings is recognised in legislation as well as national, regional and local planning policy. The following legislation is relevant to the assessment of the effects on Historic Environment receptors:

- The Ancient Monuments and Archaeological Areas Act 1979 (AMAAA) provides for a schedule of monuments which are protected and sets out measures for their protection and management. Provisions of the AMAAA are amended by the Historic Environment Scotland Act 2014;
- The Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997 (the 1997 Act) provides for the definition and protection of a list of buildings and areas of architectural and historical interest, and sets out the requirement to have special regard to the desirability of preserving the buildings or their settings in considering development proposals. Provisions within the 1997 Act are amended by the Historic Environment Scotland Act 2014.

7.3.2 Paragraph 3(2) of Schedule 9 of the Electricity Act 1989 requires the Scottish Ministers, in considering any relevant proposals for which their consent is required under Section 36 of the Act, to have regard to the desirability of protecting sites, buildings and objects of architectural, historical or archaeological interest. Where the person who formulated the proposals is a licence holder, the duty under paragraph 3(1)(b) requires that person who formulated the proposals to do what they reasonably can to mitigate any effect that the proposals would have on any such sites, buildings or objects.

Planning Policy Context

National Policies

7.3.3 Relevant national planning policies are contained within Scottish Planning Policy (SPP) and the National Planning Framework 3 (NPF3), both of which were published on 23 June 2014. In addition, relevant national policies are contained within the Historic Environment Scotland Policy Statement

2016 (HESPS) and advice relating to archaeological matters is detailed within Planning Advice Note (PAN) 2/2011 Planning and Archaeology (July 2011). Historic Environment Scotland have issued the draft of their *Historic Environment Policy* (2018) which will supersede HESPS. Relevant policies are summarised at **Table 7.1**.

Development Plan Policies

7.3.4 Relevant local policy is contained within the Outer Hebrides Local Development Plan 2018 (LDP). A summary of the relevant planning policies is given in **Table 7.1**.

Table 7.1 Planning Policy Issues Relevant to the Historic Environment

Policy Reference	Policy Issue
National Planning Policies	
SPP	Paragraph 169 identifies a number of considerations which are likely to be relevant when determining proposed energy infrastructure developments, including "*impacts on the historic environment, including scheduled monuments, listed buildings and their settings*".
SPP: Valuing the Historic Environment Subject Policy (paragraphs 135-151)	Paragraph 137 states that planning should "*promote the care and protection of the designated and non-designated historic environment*". Paragraph 140 requires the siting and design of proposed developments to take account of "*all aspects of the historic environment*". In relation to listed buildings, paragraph 141 states that "*where planning permission and listed building consent are sought for development to, or affecting, a listed building, special regard must be given to the importance of preserving and enhancing the building, its setting and any features of special architectural or historic interest. The layout, design, materials, scale, siting and use of any development which will affect a listed building or its setting should be appropriate to the character and appearance of the building and setting*". Paragraph 143 specifies that development should seek to preserve or enhance the character of a conservation area and its setting. In relation to scheduled ancient monuments, paragraph 145 states "*where there is potential for a proposed development to have an adverse effect on a scheduled monument or on the integrity of its setting, permission should only be granted where there are exceptional circumstances*". In relation to gardens and designed landscapes, paragraph 148 states that "*planning authorities should protect and, where appropriate, seek to enhance gardens and designed landscapes included in the Inventory of Gardens and Designed Landscapes and designed landscapes of regional and local importance*". In relation to archaeology, paragraph 150 states that "*planning authorities should protect archaeological sites and monuments as an important, finite and non-renewable resource and preserve them in situ wherever possible. Where in situ preservation is not possible, planning authorities should, through the use of conditions or a legal obligation, ensure that developers undertake appropriate excavation, recording, analysis, publication and archiving before and/or during development*". In relation to historic assets which are not afforded statutory protection, paragraph 151 states that "*planning authorities should protect and preserve significant resources as far as possible, in situ wherever feasible*".

Policy Reference	Policy Issue
HESPS 2016	HESPS 2016 sets out how Historic Environment Scotland fulfils its regulatory and advisory roles and how it expects others to interpret and implement Scottish Planning Policy. It is a material consideration in the Scottish planning system. Paragraph 1.9 identifies a number of key principles which underpin what HES does, including that "*there should be a presumption in favour of preservation of individual historic assets and also the pattern of the wider historic environment; no historic asset should be lost or radically changed without adequate consideration of its significance and of all the means available to manage and conserve it*".
HEP Draft 2018	HEP 2018 presents the Historic Environment Policy, revised in draft as of September 2018. Upon adoption, this document will replace HESPS and be a material consideration. A statement elaborating on applying the core principles for managing change notes that "*When decisions are made that affect places of cultural significance, the focus should be on avoiding or minimising adverse impacts. Wherever possible, special characteristics and qualities should be protected, conserved or enhanced.*"
PAN 2/2011 Planning and Archaeology (July 2011)	This document provides advice to planning authorities and developers on dealing with archaeological remains.
Development Plan Policies	
Outer Hebrides Local Development Plan (LDP) 2018	NBH 4: Built Heritage NBH 5: Archaeology NBH 6: Historic Areas Policy NBH4 requires that development that would have a substantial adverse impact on the historic significance of the built environment will only be permitted where it can be demonstrated that all reasonable measures will be taken to mitigate any loss of this significance; and any lost significance which cannot be mitigated is outweighed by the social, economic, environmental or safety benefits of the development. Policy NBH5 identifies that proposals that may adversely impact upon the cultural significance of scheduled archaeological remains or the integrity of their settings should be supported by measures that will mitigate any adverse effect on the archaeological significance, and where adverse effects cannot be mitigated a justification for the development that will outweigh any adverse effects should be provided. Policy NBH6 has a focus on proposals that are within conservation areas, but does state that proposals with a negative effect on a conservation area and its setting will not be permitted. Developments are also expected to preserve Lews Castle and Lady Lever Park as described in the Inventory of Gardens and Designed Landscapes

Technical Guidance

7.3.5 Planning authorities are directed to the HESPS, Historic Environment Circular 1, Planning Advice Note (PAN) 2/2011 and the *Managing Change in the Historic Environment* guidance note series in their consideration of planning applications affecting the historic environment. The most relevant of the *Managing Change* series are *Managing Change in The Historic Environment: Setting* (2016) and *Managing Change in The Historic Environment: Gardens and Designed Landscapes* (2016).

7.4 Data Gathering Methodology

Study Area

7.4.1 A Study Area of 500m from the boundary of the Development Site was established in consultation with Historic Environment Scotland (HES) and CNeS in Autumn 2018 (see **Figure 7.1**). This Study Area was defined to allow relevant data to be collected in order to allow an assessment of the potential presence of archaeological remains within the Development Site. A search was made of the CNeS Sites and Monuments Record and the HES spatial datasets of designated heritage assets in this area.

7.4.2 An extended Study Area of 15km from the Development Site was also determined in consultation with HES and CNeS in Autumn 2018 (See **Figure 7.3**). A search was made of the HES spatial datasets of designated heritage assets for this area.

Desk Study

7.4.3 The gathering of baseline data was carried out in accordance with the principles of Standard and guidance for historic environment desk-based assessments (Chartered Institute for Archaeologists [CIfA], 2014).

7.4.4 For the purpose of establishing the historic environment baseline, the following sources have been consulted:

- National and County-based registers of known archaeological and historical sites;
- Cartographic and historic documents;
- Aerial photographs;
- Historic Landuse Assessment (HLA) mapping;
- Published sources;
- Internet sources;
- Previous archaeological assessments of the area.

7.4.5 These sources were obtained from the following organisations:

- Royal Commission on the Ancient and Historical Monuments of Scotland (RCAHMS) (National Monuments Record Scotland (NMRS), accessed via Canmore;
- The Comhairle nan Eilean Siar (Western Isles) Sites and Monuments Record (SMR);
- Historic Environment Scotland (HES);
- The National Archives of Scotland; and
- National Library of Scotland Map Library.

Survey Work

7.4.6 A series of visits were made to relevant designated assets in the extended Study Area between 26 and 30 November 2018.

7.4.7 Previous historic environment assessments incorporating field survey (CFA 2002, AMEC Earth & Environmental 2010, Entec UK Limited 2011 and AMEC Foster Wheeler 2015) meant that that a site walkover would not provide any additional baseline information to that already available. It was therefore agreed through scoping that further survey would not be required for the purposes of informing the baseline situation at the Development Site.

7.5 Overall Baseline

Current Baseline

7.5.1 The Development Site is located west of Stornoway on the Isle of Lewis and consists of open heather moor, peat bogs and numerous lochs and lochans (a small inland loch) with a number of bedrock knolls/hillocks scattered throughout the area. The Development Site is bisected from east to west by the A858 carriageway, and is directly north of the A859 Stornoway to Tarbet Road.

7.5.2 This landscape has altered substantially over time and although it is now quite an inaccessible landscape, this would not have always been the case. Early birch scrubland was replaced by mixed birch, hazel and oak woodland by 8,000 years ago, when forests reached their greatest extent on the islands. Afterwards, forest cover went into decline and extensive expansion of blanket peat began when the climate became cooler and wetter some 6,000 years ago. The islands were probably largely devoid of trees by the end of the Bronze Age (Goodenough & Merritt, 2011). Archaeological remains of Neolithic settlement in the Outer Hebrides survive, often with very high levels of preservation, but are frequently buried beneath later deposits of peat or sand (Henley, 2005). This coverage of early archaeological material by peat or sand means that the present appearance of the landscape is not a clear indicator of the potential for earlier activity on the Development Site. However, a trial pit investigation undertaken on the Development Site in February 2014 to investigate the peat depths within the area, monitored by an archaeologist (Buchanan, 2014), did not observe evidence of artefactual material or archaeological features within areas sampled.

7.5.3 No designated heritage assets are present within the Development Site (see **Figure 7.1**), although a number are located within the extended Study Area (see **Figure 7.2).** This includes a concentration of listed buildings within the Stornoway conservation area, The Lews Castle and Lady Lever Park inventory garden and designed landscape, Scheduled Monuments and numerous listed buildings. Information gathered from previous assessments of the Development Site (Entec UK Limited, 2011) demonstrate that although no designated heritage assets are present within the Development Site boundary, there are numerous records of archaeological features, ranging in date from the prehistoric to modern eras.

Prehistoric and Early Historic Periods

7.5.4 The remains of a hut-circle were recorded during the 2011 walkover, just west of the Allt Airigh na Beiste, along with a group of shieling huts[1] (MWE4251). The hut-circle appeared to have been exposed during peat-cutting with around 0.5m of overlying peat having been removed. It remained partly buried at the time.

7.5.5 A second hut-circle was recorded during the 2011 field survey sitting on a bedrock knoll at Cnoc Loch a' Leadharain overlooking Loch a' Leadharain. The remains of this hut circle lie just west of a

[1] Shielings were summer sites associated with the grazing of livestock when the animals, principally cattle, were taken out to fresh grazing for a number of weeks, generally between June and August.

small scatter of shieling huts also recorded in field survey, which were themselves spread along a series of bedrock knolls.

7.5.6 The remains of a possible third hut-circle were recorded during the 2011 field survey just south of Loch a' Leadharain. All that remained of this possible hut-circle was a circular turf platform approximately 4.5m in diameter occupying a small bedrock knoll in an area of marshland.

7.5.7 The discovery of a hut-circle within the overlying peat, and other possible prehistoric settlement remains found in close association with later shielings, indicates that there is a high possibility that further prehistoric remains survive concealed beneath the extensive peat deposits in the Development Site and that many of the shieling groups may have early origins.

7.5.8 A Bronze Age barbed and tanged arrowhead (MWE4245) is recorded in the SMR as having been discovered at Loch Airidh Na Lic 365m east of the Development Site in 1964. However, there is no further information on the circumstances of the find or an exact location for the find-spot. As the artefact is no longer in-situ, the find-spot is of negligible heritage value although there may be some potential for further, associated, archaeological remains to survive in the area.

7.5.9 Consultation of the SPAD Database revealed records for one palaeoenvironmental site within the Development Site. The site is one of a series investigated by Wilkins (1984) to establish the likely composition, distribution and date of Holocene woodlands on Lewis. From the study, Wilkins concluded that remains of willow, pine and birch were widely distributed across Lewis and had at times formed extensive woodlands.

Medieval and Post-Medieval Period

7.5.10 A farmstead (MWE14809) is recorded at Allt na Beiste in the Ordnance Survey Name Book of 1852 and is depicted on the Ordnance Survey 1st Edition map of the same date. The map shows one roofed building, one unroofed building and two enclosures all surrounded by a head-dyke. None of the structures/features shown on the 1st Edition map now survive as upstanding remains; they have been replaced by at least 12 later shieling huts which are grouped around the Allt Airigh na Beiste burn (MWE4251). Around 200 metres to the east, within an area of commercial forestry plantation, stand the well-preserved remains of a large rectangular farmhouse, which is of stone and mortar construction suggesting that it was built in the 19th or 20th century and post-dates the farmhouse shown on the 1st Edition map. An area of lazy-bed cultivation (spade dug cultivation ridges) is present to the south of the farmhouse. A sub-circular, stone-lined hollow is also recorded in the top of a stony mound near to the farmhouse (Hooper 2001); this maybe the remains of a corn-drying kiln. These structures indicate strong continuity in landscape use up to the mid-19th century.

7.5.11 Shieling huts (MWE146131, MWE146154, MWE146712, MWE146713, MWE146714, MWE146728, MWE146729, MWE146799, MWE146815, MWE146816, MWE146817, MWE146818, MWE4246, MWE4251) are by far the most common feature type found within the Development Site (see **Figure 7.1**). The shielings were tended principally by women and children, as the men stayed behind to tend crops. Shielings are commonly associated with the Gaelic place name 'airidh' or 'airigh'; two large groups of shieling huts were recorded at Airigh an da Mhile (MWE4246) and Airigh na Beiste (MWE4251), suggesting that these areas have been long associated with summer grazing activities.

7.5.12 Shielings are usually considered to be of medieval or later date, although some recently excavated huts have been demonstrated to have prehistoric origins (Gilmour & Church 2002, Carter et al 2005). Many shieling sites can have complex layouts, with sometimes several structures overlying each other and presumably these sites have a considerable time-depth. Improved farming practices in the 18th and 19th century effectively ended the customary use of the shielings. Most of the shielings within the Development Site are either depicted as roofless on the Ordnance Survey 1st Edition maps (1851-1852) or not shown at all, suggesting that they may have been abandoned long before the mid-19th century.

7.5.13 Possible evidence for the presence of lazy-beds associated with two groups of shieling huts identified in the 2011 field survey may indicate more permanent or longer term occupation of these particular sites.

7.5.14 Most of the shieling huts recorded are of dry-stone wall construction and generally of uniform size, ranging from 4 metres to 8 metres long by 2 metres to 4 metres wide and all are rectangular in plan, although there is much variation in their state of preservation. The best preserved are visible with walls up-standing to more than 1 metre high with obvious entrances and small alcoves, known as 'aumbries', built into the walls. Most, although not all, are situated on higher dry summits or slopes generally in locations overlooking the many lochans in the area.

7.5.15 The remains of a small number of possible turf-built shielings were also recorded. In most cases all that survives of these is a small rectangular turf platform on which the turfs used to construct the shieling hut would have been placed. However, one or two shieling huts were still defined by the remains of a low turf bank on observation in 2011. There was also at this point one group of huts which were of both stone and turf construction, where the shieling has been constructed principally from turfs but with the down slope gable end built in stone, possibly for reinforcement purposes.

7.5.16 In some cases the shieling huts have been constructed on top of small mounds, and it is possible that these mounds conceal earlier structures. Other surveys carried out in Lewis (CFA 2005) have recorded shieling huts that overlie obviously earlier structures indicating continuous re-use of the shielings.

7.5.17 The majority of the shieling structures or groups (MWE146131, MWE146154, MWE146712, MWE146713, MWE146714, MWE146728, MWE146729, MWE146799, MWE146815, MWE146816, MWE146817, MWE146818, MWE4246, MWE4251) are considered to be individually of low heritage value. Six shielings (22, 23, 27, 30, 31, 33) that were recorded on historical maps (Ordnance Survey 1st Edition 1851-52) no longer survive and these are of negligible heritage value. However, collectively, shieling landscapes such as those recorded here are more properly seen as a more important group.

Enclosures

7.5.18 Two rectangular enclosures and a circular enclosure annotated 'sheepfold', are depicted on the Ordnance Survey 1st Edition maps (1851-52). These were all probably used for livestock management. No upstanding remains of these enclosures were found during the field survey.

Field Boundaries

7.5.19 A head-dyke is identified in the SMR and two further dykes annotated as 'old fence', are depicted on the Ordnance Survey 1st Edition maps within the Development Site. Fragments of these field boundaries still survived as of 2011, as turf and stone banks that cross areas of marshy land.

7.5.20 The head-dyke (1286), which originally ran from Loch Airidh na Lice in the north to Loch Lathamul in the south, would probably have separated the crofting 'infield' around Stornoway from the common grazing on the open moorland. A section of the head dyke running south from Creed Bridge to the northern bank of Loch Cnoc a' Cholich was recorded during the 2011 field survey. Substantial peat cuttings north of Creed River and associated with the former Lewis Chemical Works (MWE4325) have removed the headdyke in this area. No surface remains of the dyke were visible in marshy land south of Loch Cnoc a' Cholich. Nevertheless, buried remains of a ditch associated with the dyke may still survive running in a northeast to southwest orientation.

7.5.21 Two other land boundaries annotated as 'old fences' on the Ordnance Survey 1st Edition map, are possibly the fragmentary remnants of older field boundaries. For example the dyke just west of Airigh an da Mhile has been replaced by a later post and wire fence that follows almost the same alignment, indicating that old land boundaries are still in use today.

Other Features

7.5.22 The remains of two large dykes, annotated as 'Embankment' on the Ordnance Survey 1st Edition maps (1851-52), were found at the eastern ends of Loch a' Chlachain and Loch a' Leadharain respectively. The embankment at Loch a' Chlachain is still very well-preserved and of substantial dimensions. Constructed from turf and peat, it is 100 metres long, 12 metres wide and up to 3 metres high and spread along the southern bank of the loch. Its purpose is unknown, but it may have been some kind of flood control feature. There was little surviving of the second embankment, which once crossed the mouth of a burn running from the eastern end of the Loch a' Leadharain as of 2011.

7.5.23 The remains of a possible cairn (15263) survive on the summit of a small bedrock knoll in marshy ground to the south of Beinn Greidaig, while a further cairn (292) was identified at the head of Loch Speireag, opposite a group of shielings. These are interpreted as being either shepherd's cairns or marker cairns, which would have been used to act as way-markers, aiding navigation in poor weather in the barren landscape.

7.5.24 Another possible cairn (Canmore ref NB33SE 32) was present in an area of forestry plantation north of the Pentland Road. This has been interpreted as a possible clearance cairn (Barrowman 2003) of unknown date.

Modern Period

7.5.25 Four shielings described as modern through field survey in 2011 are principally located along the eastern side of Pentland Road. These varied in state of preservation and construction method. In general, all that exists of most of these are the concrete base on which the huts would have stood, while others survive almost intact; with stone and concrete walls and in situ chimneys/stoves and corrugated roof sections. One shieling observed in field survey, although now collapsed, had been constructed entirely from timber; while another is of corrugated iron and wood construction.

7.5.26 These shielings were, and in some cases still are, occupied seasonally, more often now during peat cutting activities or for recreation purposes, and no longer for summer grazing. Their continued use today attests to the long cultural association of shieling use on Lewis.

7.5.27 Individually these modern shielings have limited heritage value, although collectively this value would be greater.

Peat Cuttings

7.5.28 Significant areas of relatively modern peat cuttings are present along either side of the modern roads (A858 and A859) that cross the Development Site. No obviously older, relict peat cutting was recorded. Peat has been used as a source of household fuel on Lewis for many centuries, is still exploited today and is considered locally to be part of the island's cultural heritage.

7.5.29 The Lewis Chemical Works (MWE4325) was opened in 1857 by the then owner of the Isle of Lewis, James Matheson. The main aim of the works was to develop and exploit the abundant natural peat resources of the island whilst providing some stimulus to the island economy following the potato famine of the 1840s. In the process, peat was cut, dried and distilled to produce paraffin.

7.5.30 Initially the chemical works were located close to Lews Castle fish pond but were then moved outside the castle grounds, near to Creed Lodge. Substantial peat banks were created, to provide sods for the distillation process, connected by a small network of tramways and a canal to transport the peat to the works (Whiteford, information leaflet). The chemical works continued to produce paraffin for twenty years but were closed in 1874, as it could not compete with cheaper paraffin being produced from the shale mining industry in West Lothian.

7.5.31 Today the peat banks are still visible over an area covering approximately 1.5km just north of the Abhainn Ghrioda (Creed River), along with the remains of the main tramway and fragmentary sections of the canal; some of which survive within the Development Site. None of the works buildings and other structures survive as upstanding remains, all the hardware was dismantled following its closure and sold for scrap (Crabbe 1999-2000), although Whiteford (information leaflet) records that tar pits and a cartway leading to the work buildings are still visible just northeast of the Development Site.

7.5.32 The Lewis Chemical Works is a great example of Victorian experimental science and technology and is an important part in the development and history of Lewis. Today an information board providing details of the chemical works is found at Creed River Car Park / Picnic Area. The Lewis Chemical Works are of medium heritage value.

7.5.33 A small quarry pit was recorded next to the Pentland Road and a further large quarry (and associated track) were noted immediately north of the A859 public road during the 2011 survey. These were probably used to provide material for the construction (and maintenance) of the roads network.

7.5.34 A single arched stone and mortar road bridge (MWE146830), which once formed part of the public road (A859), is present crossing the Creed River. The bridge, which is in a good state of preservation, no longer forms part of the road network, having been replaced by a modern bridge.

7.5.35 A rock-shelter was recorded through field survey in 2002 (CFA 2002) against the west face of an outcrop of bedrock; formed by an alignment of boulders against the rock-face with a central stone-setting, which may be a hearth. The feature, which may have been used as a shepherd's shelter, is of unknown date and function.

Future Baseline

7.5.36 If the Consented Stornoway Wind Farm or the Proposed Development were not to proceed there would be no change to the baseline condition of the Development Site. The current peatland environment would likely continue with limited domestic peat extraction continuing at the periphery. There would be limited disturbance to heritage features, and only natural decay would occur to upstanding remains. There would be no change to the setting of external heritage assets.

7.6 Consultation

7.6.1 **Table 7.2** provides a summary of the issues that have been raised by consultees in relation to the Proposed Development and the responses given.

Table 7.2 Summary of Issues Raised during Consultation Regarding the Historic Environment

Issue Raised	Consultee(s)	Response and how Considered in this Chapter
Scope of assessment – agreed generally, advise that heritage assets not within ZTV cannot necessarily be ruled out.	HES	Acknowledged and expanded on in **Section 7.7**
Recommendation that potential mitigation is explored reducing impact of two turbines closest to Druim Dubh (7 and 8 as of scoping) to a level where no longer significant	HES	Recommendations for mitigation set out in **Section 7.14, 7.16**
Pre-application consultation, including visualisations where possible on the scheme impact on Lews Castle and Lady Lever Park Inventory GDL	HES	Relevant visualisations included in LVIA (**Chapter 6**)
Agree a finalised list of assets to be assessed	HES	Rationale behind asset inclusion set out in methodology and agreed with Ruth Cameron, HES, by email
Consult LDP Policies on the Historic Environment	CnES	LDP policies consulted and referenced in **Table 7.1**
Clusters of assets identified in 2015 in the north and east of the site. Consider these for direct assessment	CnES	Direct effects considered with reference to previous assessments, field surveys and CnES data**. Sections 7.7 and 7.10**
Local heritage asset data scope	CnES	500m Study Area applied, local SMR data acquired through CnES for site and immediate surroundings, with Canmore data. This informs the assessment of direct effects.
Reference Calanais setting document and ensure intervisibility of Calanais stones and satellite sites considered.	CnES	Referenced directly and incorporated into indirect impact assessment, **Section 7.11**
Consideration of the Iolaire memorial	CnES	Setting and effects of development on same assessed along with other indirectly effected assets: **Section 7.11** and **7.12**
Consult closely with CnES on all aspects of the assessment of the topic including the selection of heritage assets for further assessment.	CnES	Contact made with Kevin Murphy by email and telephone prior to heritage asset visits, setting out key concerns and rationale, inviting feedback.

7.7 Scope of the Assessment

Spatial Scope

Direct Effects

7.7.1 As direct effects would arise only as a result of physical disturbance or damage to heritage assets, the potential for direct effects is confined to the footprint of the Proposed Development (**Figure 4.1**). Therefore, the scope of assessment for direct effects is restricted to the Development Site only.

Indirect Effects

7.7.2 The scope of assessment of indirect effects is confined to those assets set out in the scoping opinion which were identified through data searches of an area up to 15km from the Development Site and study of predicted ZTVs of the Proposed Development or were identified through consultation. A list of heritage assets within the extended Study Area is provided in **Appendix 7A**, and their locations are shown on **Figure 7.2**.

7.7.3 For the purpose of understanding the settings of these heritage assets, they have been generally considered as groups of assets linked by either physical proximity or thematic links. This does not presuppose that individual assets within each group have the same setting, but acknowledges that there are sufficient similarities and common characteristics to the settings of these assets to allow them to be discussed together.

7.7.4 The baseline setting of each relevant heritage asset or related group of assets was characterised on a case-by-case basis. Characterisation of setting of an asset was based upon its properties and location, and took into account the factors identified in guidance issued by HES (2016). The baseline setting of each asset was characterised principally in terms of the:

- Archaeological / historical context of the asset;
- Current perceptual, primarily visual, surroundings of the asset;
- Aesthetic and experiential properties of the asset within its surroundings; and
- Such factors as: the location and orientation of the asset; important views of and from principal facades; the importance, if applicable, of designated settings, and any obvious views or vistas.

7.7.5 Where it was established that the setting of a heritage asset is such that there is no potential for it to be affected by the presence of the Proposed Development, the heritage asset is not considered further in the assessment.

Temporal Scope

7.7.6 The temporal scope of the assessment of the historic environment is consistent with the period over which the Proposed Development would be carried out. This, therefore, refers to the following key stages of development:

- Construction – the effects may arise from the construction activities themselves, or from the temporary occupation of land. Effects are often of limited duration although there is potential for permanent effects, particularly where archaeological remains are disturbed;
- Operation – effects may be permanent, or they may be temporary, intermittent, or limited to the life of a proposed development until decommissioning (as in the case of wind power developments which gain planning permission for a defined and finite number of years); and

- Decommissioning - effects may arise from the decommissioning activities themselves, or from the temporary occupation of land. The effects would generally be temporary and of limited duration. Additional permanent change would normally be unlikely unless associated with restoration.

Potential Receptors

7.7.7 Potential receptors have been distinguished through the nature (direct or indirect) of the anticipated development impacts.

Potential Receptors of Direct Effects

7.7.8 Direct Effects would arise during the construction phase and would be permanent and irreversible. Operation and decommissioning of the Proposed Development are not anticipated to result in additional ground disturbance and therefore direct effects would not arise during these phases.

7.7.9 The potential receptors of direct effects comprise archaeological remains and archaeological deposits surviving within the Development Site, represented in data obtained from CnES (see **Figure 7.1**).

7.7.10 The proposed site entrance crosses an area of former peat workings associated with the former Stornoway Paraffin Works (MWE4325) and a former head dyke (MWE145731).

7.7.11 The access to proposed turbines T21-T35 crosses an area occupied by former shielings (MWE146816).

7.7.12 In that the HER is a record of previously recorded archaeological features, the potential remains that previously unrecorded archaeological remains and deposits of geoarchaeological or paleoenvironmental interest may be affected by the Proposed Development.

Indirect Receptors

7.7.13 Indirect effects arising during the construction phase would be short-lived, and therefore these effects are more appropriately considered as operational effects. Removal of the proposed wind turbines at the end of the operational period would result in the effective reversal of any change to setting. However, in line with SPP, the effects of the Proposed Development are considered in perpetuity and the ability to reverse any adverse change to setting has not been considered within this assessment.

7.7.14 Indirect receptors comprise designated and non-designated heritage assets identified within the scoping report (see **Figure 7.2** and **7.3**). These were identified through a combination of searches of existing registers of heritage assets and consultation with HES and CnES. Identifiable groups of heritage assets have been discussed as groups in terms of baseline and general discussion of change to setting, but an individual assessment of each heritage asset has been undertaken.

Likely Significant Effects

7.7.15 The scoping report identified the potential for significant adverse effects to arise on the following receptors:

- Direct Effects:
  - Previously recorded archaeological heritage assets within the Development Site;
  - Previously unrecorded non-designated heritage assets within the Development Site.

- Indirect Effects[2]:
  - Aird Thunga, chambered cairns;
  - An Rubha, listed buildings, prehistoric monuments in the interior and prehistoric monuments on the north coast of the peninsula;
  - Calanais monument group, including Calanais Stones (or Calanais I) and associated monuments;
  - Iolaire memorial monument, Holm;
  - Lews Castle and Lady Lever Inventory Garden and Designed Landscape (GDL), including Lews Castle Category A listed building and Cnoc na Croich scheduled chambered cairn;
  - Stornoway Conservation Area, including individual listed buildings within; and
  - individual heritage assets identified within ZTV at Gress, Barabhas, Bragar, Marbhig.

7.8 Environmental Measures Embedded into the Proposed Development

7.8.1 Data gathered for both designated and non-designated heritage assets has been made available to the design team to allow consideration for avoidance of direct impacts upon the heritage assets within the Development Site and to identify areas of higher sensitivity to indirect effects, so that design evolution has been used to minimise adverse change. Design evolution is discussed in **Chapter 3**.

7.8.2 During the design process, views from key heritage assets were considered in some detail. In particular, effects on heritage assets at Stornoway and the Eye Peninsula were minimised by increasing the separation of the proposed turbines from Stornoway and ensuring that the composition of the array when viewed from the east was balanced and coherent.

7.8.3 Effects on the stone circle at Druim Dubh were considered as a result of the proximity of the asset to the Proposed Development and the clear views into the Development Site that can be had from the asset. The principal amendment here was to move the proposed turbines T8 and T9 from the scoping layout, which had appeared as outliers in views from the asset and had contributed to increasing the lateral spread of the Proposed Development, and by moving turbine T7 slightly downslope from the scoping layout, reducing its apparent height. The movement of these turbines meant that the composition of the Proposed Development presented a more compact appearance, occupying a smaller proportion of the view north from the asset.

7.8.4 Visibility of the Proposed Development from the Calanais Group of prehistoric monuments was also considered, with the intention of ensuring that visibility of the proposed turbines would be limited by the hills to the east of the asset. Detailed design iteration was used to reduce the number of visible turbines to the minimum consistent with the deign parameters of the Proposed Development.

7.9 Assessment Methodology

7.9.1 The levels of effect upon a heritage asset for either direct or indirect effects would largely depend upon its level of importance and the potential magnitude of change as a result of the Proposed

[2] Key assets identified through consultation and scoping are referred to under group headings but are considered individually with relationships between assets discussed where necessary.

Development. **Tables 7.3** and **7.4** respectively provide details on how the historic environment assessment would establish importance and magnitude of change, which would then inform the conclusion as to the level of effect upon the asset based on a matrix approach set out in **Table 7.5**, this being tempered by professional judgement as necessary.

7.9.2 The rationale contained within **Table 7.3** is predominantly based on information provided within the SPP (Scottish Government, 2014) and the associated supporting documents; HES Policy Statement (HES, 2016b) and the Scottish Planning Policy Historic Environment Circular 1 (HES, 2016d). Note that the categorisation of the relative importance of those assets which are of less than national importance generally relies on professional judgement.

Table 7.3 Categorisation of Importance

Importance	Rationale
National and International	World heritage sites are designated on the basis of 'Outstanding Universal Value' and would normally be considered of international importance. By legal definition, Scheduled Monuments are considered as being of national importance. As the process of scheduling is ongoing and as scheduling is a representative designation, there are further assets which are not scheduled but which may be of equivalent importance. HES describes Category A listed buildings as buildings of national or international importance, either architectural or historic; or fine, little-altered examples of some particular period, style or building type (HES website - Categories of listed building). The SPP states that sites identified within the Inventory of Historic Battlefields and the Inventory of Gardens and Designed Landscapes are of national and/or international importance. Conservation areas rated by HES as of Outstanding quality (where such appraisals have been made) could be considered as being of national importance.
Regional	These include archaeological sites which do not merit scheduling but which are nevertheless of interest or which could make a substantial contribution to established regional research agendas. HES describes Category B listed buildings as buildings of regional or more than local importance; or major examples of some particular period, style or building type, which may have been altered (HES website - Categories of listed building). The principles of selection for designation of conservation areas do not explicitly include valuations of national, regional or local importance, although most examples would be of importance on a regional level. Designed landscapes that are recognised by local authorities but not included within the Inventory of Gardens and Designed Landscapes would usually be considered to be regionally important.
Local	The majority of non-designated assets would normally be considered of local importance. HES describes Category C listed buildings as buildings of local importance; lesser examples of any period, style or building type, as originally constructed or moderately altered; and simple, traditional buildings that group well with other listed buildings (HES website - Categories of listed building).
Lesser	These include those features which are no longer extant, where there are no further known or surviving remains (e.g. locations of previous archaeological work), or where assets may have minimal importance, such as modern quarries.

Table 7.4 Potential Magnitude of Change

Magnitude	Definition
High	Total or substantial change to an asset or complete alteration of the characteristics of an asset's setting.
Medium	Partial alteration of an asset. Substantial change to the key characteristics of an asset's setting, or a more total alteration which is temporary and/or reversible.
Low	Minor alteration of an asset. Changes to a setting which do not affect the key characteristics, or which is short term and/or reversible.
Negligible	Minor alteration of an asset. Minor and short term or very minor and reversible changes to its setting which do not affect the key characteristics.

Table 7.5 Matrix of Significance – Level of Effect

	Importance			
Magnitude of Change	**National and International**	**Regional**	**Local**	**Lesser**
High	**significant**	**significant**	Not significant	Not significant
Medium	**significant**	Not significant	Not significant	Not significant
Low	Not significant	Not significant	Not significant	Not significant
Negligible	Not significant	Not significant	Not significant	Not significant

7.10 Assessment of Direct Effects on the Historic Environment

Previously Recorded Archaeological Heritage Assets

7.10.1 The Development Site entrance crosses an area of former peat workings associated with the former Stornoway Paraffin Works (MWE4325) and a former head dyke (MWE145731). The former peat cuttings are of local importance, primarily as visible relics of a past industry. The former head-dyke relates to pre-modern land divisions within the landscape and is also of local importance.

7.10.2 These heritage assets are both extensive features and any adverse effects would be confined to a small proportion of these. Effects would be mitigated through the implementation of an agreed scheme of archaeological recording and consequently any adverse change would be of negligible magnitude. Any effects on these local importance assets would be not significant.

7.10.3 The access to proposed turbines T21-T35 crosses an area occupied by former shielings (MWE146816). These features are predominantly of local importance, but may be of regional importance where, as is relatively common, they are located on the sites of earlier features or where they are relatively well-preserved.

7.10.4 These shielings occupy an extensive area and effects would be confined to a small proportion of these. It may be possible to use the agreed allowance for micrositing access roads to further reduce any adverse effects. Effects would be mitigated through the implementation of an agreed scheme of archaeological recording and consequently any adverse change on these potentially regionally important assets would be of negligible magnitude. Any effects would be not significant.

Previously Unrecorded Heritage Assets

7.10.5 There is some evidence for prehistoric settlement and activity in and around the Development Site. Three hut-circles have been recorded within the Development Site, one of which (MWE143045) survives under 0.5m of peat and was only revealed following peat cutting. This, and the recent discovery of the Druim Dubh stone circle, suggests that prehistoric and possibly early, medieval remains may survive concealed beneath the extensive peat deposits in the Development Site.

7.10.6 Similarly, a kerb cairn of Bronze Age date was discovered beneath less than 0.3m of peat during a road widening scheme at Breasclete (Neighbour 2005). In addition, sub-peat walls and enclosures have been uncovered at: Calanais and Dell (Armitt, 1996); at Sheshader (Newell 1988); and slightly further afield near Loch Portain in North Uist (Mills et al 1994). These discoveries show the potential for substantial remains to survive beneath peat deposits. These sub-peat archaeological remains are often both well-preserved sites and contain waterlogged deposits with good artefact preservation and palaeoecological potential.

7.10.7 Previous research (Wilkins 1984) indicates that well-preserved palaeoenvironmental remains survive within the Development Site and these provide a wealth of information on Lewis's past environment. Preliminary peat depth data (presented in **Appendix 9H**) indicates that much of the Development Site is covered in peat ranging from 1m to 2.5m in depth, with some pockets of deeper peat in excess of 4m being recorded. Such peat depths, if undisturbed, can represent several thousands of years of vegetation history and preserve a full Holocene palaeoenvironmental record along with evidence for human impact on the environment.

7.10.8 The majority of visible features preserved within the Development Site are almost all attributed to medieval or later rural land-use and transhumance practices (the seasonal movement of livestock to summer pastures away from permanent settlement) and the majority are located on the higher, drier knolls. Prehistoric settlement remains in close proximity to at least two of these shieling groups, at Allt na Beiste and Cnoc Loch a' Leadharain, suggests that many of the identified shieling groups may have earlier origins.

7.10.9 A large swathe of land within the eastern half of the Development Site, just northwest of Creed Bridge, has been substantially exploited for peat extraction as part of the Lewis Chemical Works (MWE4325) in the mid-19th century. The peat in this area was, as of 2011, beginning to regenerate. However, due to the industrial nature of the peat workings, carried out over two decades in the mid-19th century, it is considered unlikely that significant archaeological remains are yet to be discovered in this area.

7.10.10 Recent attempts have been made to plant commercial forestry at Druim Speireag, Beinn Gredaig, on the southern slopes of Beinn Thulabaigh and at Sithean Mor. Much of this planting has been unsuccessful. The remains of shieling huts and other features have been recorded in clearings within the afforested areas. However, deep ploughing (in some cases up to 1m deep) in advance of tree planting has substantially disturbed the ground in these areas. The commercial forestry areas are principally on higher ground and the peat depth analysis (**Appendix 9H**) indicates that the peat cover in these areas is generally less (primarily 0-1m deep, although up to 2m deep in some places) than the lower lying marshy areas. Given the deep ploughing in advance of forestry plantation and the relatively shallow peat depths in these areas it is considered that there is limited potential for buried archaeological remains to survive in the forested areas.

7.10.11 It is therefore likely that unrecorded heritage assets are potentially present within the Development Site as scattered concentrations of archaeological material or as isolated areas of palaeoenvironmental significance, primarily deeper peat deposits. These are likely to be localised survivals of features which are of predominantly local importance, and the relatively small scale of the Proposed Development means that it is likely that any effects would be localised and limited to smaller elements of heritage assets.

7.10.12 Any potential effects would be mitigated by the adoption of a scheme of archaeological work agreed with the CnES Archaeologist. Consequently, no significant adverse effects are anticipated.

7.11 Assessment of Indirect Effects on the Historic Environment

Achmore

Importance and Present Setting

7.11.1 Achmore stone circle (SM4355) is a Scheduled Monument and asset of national importance located approximately 3.6km to the southwest of the Development Site. The monument stands in raised heather moorland overlooking Acha Mor village from the northeast. Only two stones of the circle still stand, the others were observed lying under the peat during the 1980s. There are open views out to the south and southwest, across the village and to the hill ranges to the south including 'The Old Lady of the Moors'. It is believed that the main focus of the stone circle is linked to the rising and setting of the moon/sun over this hill range. Views to the north and northeast are restricted by a natural rise in topography. The current setting of the asset therefore makes a positive contribution to its understanding and appreciation.

Change to Setting

7.11.2 The proposed turbines would be prominently visible at a distance of at least 3.5km (T1 being the closest turbine) in views to the northeast from the asset, but away from the key views to the south and south-west, and would not intervene in views towards the village or towards the hill ranges and conjectural sunrise alignments that contribute to understandings of the past use and significance of this asset. Turbines would be visible in juxtaposition with the asset in some views from the east and south east.

Significance of Effect

7.11.3 The basic landscape context of the asset and the perception of it being in a remote place would remain unchanged. The Proposed Development would not affect key views from the asset to the south and south-west. The Proposed Development would be clearly visible but the integrity of the setting would be unaffected and the change is assessed as being of low magnitude. This would give rise to an effect on this asset of national importance that would be not significant.

Aird Thunga, Burial Cairns and Manse

Importance and Present Setting

7.11.4 These heritage assets comprise the remains of two scheduled prehistoric burial cairns both heritage assets of national importance, Dunan chambered cairn (SM 1663) and Allt an t-Sniomh chambered cairn (SM 5330), stand in open flat heather moorland approximately 1km to the northwest of Aird Thunga. Both are located on low knolls on the east facing slopes of Cnoc Dubh and on opposite sides of the Allt an-t-Sniomh. They are possibly contemporary in date, and if this is the case then they were likely constructed specifically to be intervisible across the river. There are open views out to the surrounding landscape in all directions, particularly focused along the Allt an-t-Sniomh valley to the northeast and southwest, and out to the east taking in the coastline. Both cairns have current settings that make a positive contribution towards their understanding and appreciation by providing a sense of remoteness and the absence of discernibly modern elements in the immediate surroundings of the assets that accord with contemporary perceptions of time-depth.

7.11.5 The former parish manse of Tong (LB 50803) is a Category C Listed Building and of local value. It stands in open farmland on the southwest edge of Aird Thunga overlooking the Sands of Tong. It is a rare example of an early manse, and one of a few such sizeable buildings on the Isle of Lewis, and has been converted into a farmhouse that forms part of a working farm. The building stands on the southern edge of the farmstead and is surrounded on its north and east sides by several modern barns and other ancillary structures. The main elevations of the house are orientated northeast, looking across the farmstead, and southwest, focused on the bay, with Stornoway in the far distance. It has a current setting that makes a positive contribution to its understanding and appreciation through providing a clear link to the distinctive landscape of Lewis and its relationship with the sea.

Change to Setting

7.11.6 The proposed turbines would be visible as partly-screened and distant elements of the background to views to the southwest from these assets, the closest turbine being no. 34 at 6.7km southwest from Dunan and 7.0km southwest from Allt an-t-Sniomh. Turbines would only be visible in the arc from west by southwest to southwest and would not be visible in juxtaposition with the views toward Stornoway.

Significance of Effect

7.11.7 The proposed turbines would not be prominent in views of or from the assets and would not affect the relationships between these assets and their immediate surroundings which are the primary contribution of their settings. Consequently, the integrity of the setting of these assets would not be affected and the change on each heritage asset in this group would be of negligible magnitude and effects would be not significant.

An Rubha/Eye Peninsula Including Prehistoric Stone Monuments, Settlements, Manse and Medieval Church Remains

7.11.8 This group comprises a number of designated heritage assets spread across the particular landscape of An Rubh/Point, the Eye peninsula east of Stornoway, including elements of past and present ecclesiastic buildings at the church of St Columba, the former Manse at Cnoc, Knock Kirk, and prehistoric features including the duns at Loch an Duin and Dun Mor chambered cairn at Fleisirin and the chambered cairn at Dursainean.

Importance and Present Setting

7.11.9 The roofless ruins of St Columba's Church (SM1684), which is a heritage asset of national importance, are set within a small graveyard designated as a Category A-listed building (LB19210) located close to the sea shore on the western edge of An Rubha (Eye Peninsula). The church originally dates to the 14th century when it was founded on an earlier religious site, possibly associated with St Catan. The church was enlarged during the 16th century and used for worship until the mid-19th century. It has recently been consolidated after threat from coastal erosion. Its current setting is chiefly associated with the historic graveyard in which ruins of St Columba's Church sits, a modern graveyard to the west and its location on a north-facing coastal cliff. The church has a setting that makes a positive contribution to its understanding and appreciation by providing a perceptually remote and tranquil location which accords with modern perceptions of an appropriate setting for a ruinous structure and locating the asset within the distinct island landscape.

7.11.10 Cnoc former manse (18671), a Category B Listed building, of regional importance, stands on the western coastline of An Rubha and is set within a small walled garden; it is now a private residential property. The main elevations of the house are orientated to the north and south, and a driveway leads up to the house from the north. The house and its garden are surrounded by open flat arable farmland that runs along the coast of the peninsula. Views from the upper floors of the house are principally focused out over the farmland to the coast and open seascapes. The former manse has a setting that makes a positive contribution to its understanding and appreciation through its location within a distinctive island landscape.

7.11.11 Knock Church of Scotland (18675), a Category B listed building, of regional importance, is located at a hillside road junction in Garrabost, a village on the north side of the centre of An Rubha. The main elevations of the 19th century church face north and south and each have five window bays, of narrow and tall round-arched appearance. A vestry and session is located on the west flank of the building, with the entrance on the east flank accessed by a wide-arched doorway set between two tall and narrow round-arched windows, and beneath a belfry. Views from the south of the building/entrance from the A866 road/car park follow the downhill slope northwest across a sea inlet to the northern extent of Lewis. The current setting consists of the hillside situation and spatial relationship to the main street of detached houses and gardens flanking the A866. The church has a setting that makes a positive contribution to its understanding and appreciation by providing a locally prominent situation within the distinctive island landscape with a direct visual connection with Stornoway.

7.11.12 Dun Mor (5366) is a Scheduled Monument and heritage asset of national importance consisting of the remains of a dun on a promontory over 30m above sea level. The site was probably fortified in the Late Iron Age and occupation may have persisted until early Mediaeval times. The dun is situated on a natural mound that drops sheer to the sea on the north and east sides. Part of the dun is encroached upon by a croft to the southeast. The stone and turf wall completely enclosing the level summit of the mound has fallen over the cliff in the northwest portion. There is a reasonably well-preserved portion of wall along the east side: here the wall thickness is c.3.3m and the height c.0.8m. The mound rises 10m above the surrounding land. The central court of the dun is a flat area with shallow lazy-bed cultivation which cuts through the wall in the northeast. The overall measurements of the enclosed summit are 35m east-west by 22m north-south. The dun can only be safely approached from the southeast. The Dun's setting is characterised by its seaside promontory location, relative isolation from Garrabost village and seaward views. The Dun is a Scheduled Monument of national importance and has a setting that makes a positive contribution to its understanding and appreciation through providing a perceptually remote and tranquil location which accords with modern perceptions of an appropriate setting for a ruinous prehistoric structure and which locates the asset within the distinct island landscape.

7.11.13 Dursainean chambered cairn (SM5357) is a Scheduled Monument consisting of the remains of a chambered cairn situated on the summit of a small hill, constructed within the Neolithic period. It is a designated heritage asset of national importance with archaeological and historical interest. While the cairn is substantial it has suffered severe disturbance in the form of much of the overlying material being robbed for house building. The chamber, contained within four central corner stones, is slightly to the northeast of centre. There is a split slab which may have been a capstone. Many stones, both upright and fallen, are concentrated in this part of the cairn forming part of the chamber. The setting of this monument is characterised chiefly by its hilltop situation and its views outward from the summit and spatial relationship with two other nearby prehistoric features. This setting incorporates views of and from the built environment to the north, west and south.

7.11.14 A standing stone 500m northeast of Cnoc nan Dursainean (SM5342) is a Scheduled Monument nominally dated to the Bronze Age, situated on a low mound above the north bank of a stream. There is a slight depression (4m in diameter) round the stone holding several small embedded boulders. There is an area of loose stones immediately north of the mound. The statement of national importance for this monument refers to it as an element of a landscape rich in ritual monuments of presumed late Bronze Age date, and its proximity to the earlier Dursainean chambered cairn suggests some deliberate location in relation to that monument. The setting of this standing stone comprises its immediate surroundings and streamside location, in addition to views from the mound it occupies and the spatial relationship with the chambered cairn. A visit to both assets in November 2018 noted some degree of promotion of this aspect of An Rubha's historic environment with a marked trail and path. This is a monument of national importance (archaeological, historical interest).

7.11.15 The standing stone Clach Stein (SM5336) is a Scheduled Monument comprising a fallen Bronze Age monolith. Beside it is another large prostrate stone. The larger stone, which has split cleanly in two, would originally have been 3.3m long and is 1m wide. The broken pieces measure 2m and 1.3m long. The second stone, immediately to the north of the first is 3m long and 1m wide, with an empty stone-hole to its north. These features are situated on a slight circular mound and a short bank, 1.3m high, lies 12m to the north. In the immediate environs of the monument are several field walls and cairns of field-cleared stone, probably the remains of cultivation of some antiquity. This is further from the Dursainean chambered cairn than the northeastern standing stone but its location appears to be broadly aligned with the other two features. This suggests a deliberate spatial relationship which would again influence the monument's setting. The Scheduled Monument is a heritage asset of national importance and its setting makes a positive contribution to the appreciation and understanding of the monument through providing a perceptually remote and tranquil location which accords with modern perceptions of an appropriate setting for a ruinous structure and locating the asset within the distinct island landscape.

7.11.16 The dun at Loch an Duin (SM5365) is a Scheduled Monument and heritage asset of national importance comprising the remains of a dun situated on an islet in a loch. The dun is approached from the north by a boulder causeway, which becomes submerged in heavy rain. This approach defines the main view of the asset and, in part its setting: views from the north of a ruined fortified structure looking south along the structure itself along with the loch in which it is located. The setting of the asset is defined by the loch and approach.

7.11.17 A Scheduled Monument comprising a chambered cairn at Caisteal Mhic Creacail Fleisirin (SM5346) is a heritage asset of national importance. This is located in an area of moorland to the west of a small stream running south-north into Broad Bay. The setting of this monument comprises this landscape character and a sense of isolation given its 540m distance northwest of the nearest township, in addition to views out north across the bay. This provides a sense of liminality for the asset being so close to the land's edge, in addition to a sense of remoteness.

Changes to Setting

7.11.18 The change to setting would consist of new turbines appearing in views westward from the assets described above, moving in and out of views subject to partial screening by local topography and the built environment. Local topography rises to the east of the isthmus connecting An Rubha to the rest of Lewis while local undulations, particularly in the higher ground at the centre of the peninsula, serve to alter the extent of the turbines that would be seen. The built environment on much of the peninsula consists of small clusters of houses forming crofting townships, largely focused at the coasts and generally at some distance from assets identified further east. Turbines would not be visible in any views from the assets discussed to the east, south or north.

7.11.19 Turbines would be visible as very distant, background elements from most of the assets identified above and would be peripheral in the case of those located on the north coast; Dun Mor and Caisteal Mhic Creacail Fleisirin. In the case of both assets, the viewer would need to turn and focus further west than the location and orientation of the assets would suggest. At any rate, the key setting relationship of these assets is with Broad Bay, echoing the historic relationship with the sea. Turbines would appear in views west from St Columba's chapel, partly concealed behind extant memorials in the modern graveyard to the west and behind regular air traffic in and out of

Stornoway airport. Views of turbines west from Clach Stein, Cnoc nan Dursainean and Dursainean chambered cairn would be more open, with a greater number visible from the latter in particular owing to its location on higher topography and the absence of buildings in the short and middle distance.

Significance of Effects

7.11.20 The magnitude of change on St Columba's Church and associated churchyard would be low as turbines, while visible from these assets would not form a dominant feature in views to the west and the setting of these assets as influenced is localised and based on the spatial relationship of the church and churchyard. As views across the bay to the north and associated seascapes would be unaffected the Proposed Development effects are considered to be not significant.

7.11.21 Views from Cnoc former Manse are principally oriented north-south across surrounding arable land and gardens to the sea and Broad Bay, reinforcing the island location of the building. As the turbines would appear to the west and would be peripheral to these views from the asset, the magnitude of change would be low and effect would be not significant.

7.11.22 Visibility of the proposed turbines as distant features to the west would not affect either the relationship of the church to the village or the sea and would not challenge its localised prominence. Consequent, any change would be of a negligible magnitude and the effect would be not significant.

7.11.23 The presence of turbines in views westward from Cnoc nan Dursainean standing stone would be distant and peripheral to the key elements of the monument's setting, being its spatial relationship to Dursainean chambered cairn, streamside location, and views north toward Broad Bay. This would result in a change of low magnitude and, as such, the integrity of this monument's setting would not be affected resulting in a not significant effect.

7.11.24 The higher topography on which the Dursainean chambered cairn is located would mean that a greater number of turbines would be visible from here, in an arc from east to east by northeast. However, the considerable distance of the turbines, with the closest turbine being 13.7km away from the cairn would ensure they would present to the viewer as a very distant background feature in views and the landscape context of the monument (open moorland, views south and north to the sea and bay, views across the peninsula toward the island interior) would not be altered. This would result in a low magnitude of change. The integrity of the setting would not be affected therefore and the effect would be not significant. Further west, the visibility of blade tips to the west from Clach Stein would not affect the setting integrity of the monument – this is largely characterised by its present within a moorland field, on a slight downward slope to the south and east with views of the sea and further along the upland interior of An Rubha. The magnitude of change would be negligible and the integrity of the asset's setting would not be affected. The effect would be not significant.

7.11.25 The two coastal assets discussed above, Dun Mor and Caisteal Mhic Creacail Fleisirin both have landscape contexts characterised by isolation and seaward orientation, with views north across Broad Bay. While Dun Mor is a fortified site and Caisteal Mhic Creacail Fleisirin is a burial monument, the choice of siting in both cases appears to make use of similar topographic factors and as such the effect on both is discussed in general terms. The views of very distant views of turbines in the arc from west to southwest in the case of Dun Mor and west by southwest to southwest in the case of Caisteal Mhic Creacail Fleisirin, would give rise to a low magnitude of change in the case of the former and negligible magnitude of change for the latter. The integrity of these asset's settings would not be affected and as such, the effect would be not significant.

7.11.26 Loch an Duin's location in an area of relatively low topography indicates turbines would be largely screened from view. The key views from the dun site are in the short-to-middle distance around its

Lochside location and, as such, very distant views to the Proposed Development would present a negligible magnitude of change which would give rise to an effect which would be not significant. The integrity of the asset's setting would not be affected.

Arnish Point

Importance and Present Setting

7.11.27 The remains of a WWII coastal battery (SM 5347), comprising two gun-emplacements, battery observation post and two searchlight platforms, are present on the eastern edge of Arnish Point. The structures are all situated on the highest ground of the point, lying between the Arnish Lighthouse, approximately 200m to the north, and a large fabrication yard, approximately 100m to the southwest. The battery overlooks the east-facing cliffs above Downies harbour and is focused principally on the eastern coast line and open sea. Its current setting is the open coastline in which it stands and overlooks. The coastal battery, which is a Scheduled Monument, and of national heritage value, has a setting that makes a moderate contribution to its understanding and appreciation through the expression of historic, functional links to the sea and the defence of Stornoway harbour.

7.11.28 Arnish Lighthouse and attendant buildings (LB13328) is situated at the head of Arnish Point overlooking Stornoway harbour. The buildings were built in the mid-19th century and were manned up until the 1960s. Once the lighthouse was de-manned the attendant buildings became holiday self-catering accommodation. The lighthouse continued in use until 1971 when the automatic light was destroyed by a gale and replaced by a buoy (Stornoway Historical Society website link). During its use, the lighthouse was an important focal point for maritime travellers and it is still a prominent feature from the ferry as it passes on its way to and from Stornoway harbour. The lighthouse and its associated attendant buildings are Category B Listed, of regional value, and have a setting contributes to their understanding and appreciation through the visual links to the sea and the approaches to Stornoway harbour. The views across the Cala Steornabhaigh to the site of the wreck of the Iolaire provide a poignant reminder of the dangers of the sea.

7.11.29 The category C- Listed Arnish, Monument (LB13329) comprises of a stone cairn that was apparently constructed by the Mathesons of Lews Castle in the 1860s. The cairn commemorates Prince Charles Edward Stuart's journey to Lewis in 1746 following the Battle of Culloden. The cairn stands in an area of open moorland, approximately 100m to the east of Arnish Loch, on the coastline. There are open views out to the surrounding landscape particularly focused to the coastline and seascapes to the east; views to the west across the loch are restricted by a natural rise in topography. The setting of the cairn, which is of local value, is characterised through illustration of links to a wider designed landscape, the invocation of a specific Scottish identity by the landed elites of its day, historic links to Stornoway harbour and to Bonnie Prince Charlie's arrival in Stornoway.

Changes to Setting

7.11.30 The Proposed Development would be located over 4km from Arnish Monument and just under 5km from the other structures. Views from the structures are limited by surrounding modern built features, such as the Fabrication Yard and associated buildings present immediately to the southwest of the coastal battery, and by natural rises in topography to the west, which limit views across the Development Site. Turbines would not appear in key views across the Cala Steornabhaigh towards Stornoway or out into the harbour approaches.

Significance of Effect

7.11.31 The presence of the Proposed Development would not affect the setting of these assets. The formal and functional locations of the Arnish gun battery and lighthouse are both closely linked to their presence in and views of Stornoway harbour, and the Arnish Monument's setting is based on its presence overlooking the bay. It is considered that the magnitude of change is negligible as the integrity of the settings of these assets would not be affected and therefore effects are not significant.

Arnol and Bragar

Importance and Present Setting

7.11.32 Heritage assets within the ZTV in this area consist of a pair of scheduled horizontal water-mills in Bragar at Allt na Muilne (SM5412). These mills, of likely 19th century construction date and of national importance, are connected by a lade, the bank of which is lined with boulders. The northern mill has been restored and the southern mill is in ruins. The setting of this asset is characterised by its streamside location in open fields to the rear of upstanding buildings in Bragar village. This setting is considered to make a positive contribution to the significance of the asset.

Change to Setting

7.11.33 The addition of turbines in long views to the southeast (the closest turbine would be no 25, 14.2km away), partially screened by existing buildings would present a minor visual change, and turbines would be difficult to discern at a distance of over 14km. The immediate surroundings of the monument, which provide the principal contribution of setting including its waterside location would be unaffected.

Significance of Effect

7.11.34 The Proposed Development would be a barely discernible element of a minor views from the asset. This would give rise to a negligible magnitude of change and the integrity of the setting of this asset would not be affected. The effect would be not significant.

Barabhas

7.11.35 Two Category B-listed buildings of regional importance are located within the ZTV in Barabhas; the parish church (LB5762) and thatched roof garage (LB5766). The setting of both of these buildings is characterised largely by the roadside layout and their location in relation to other nearby buildings comprising the present rural-coastal village, contrasting in architectural style with more functional domestic buildings. The church occupies a slightly raised location, which coupled with its massing gives it a localised sense of dominance.

Changes to Setting

7.11.36 As the Proposed Development would be located a considerable distance from these buildings, with the closest turbine (T32) 13.8km south of the parish church, the effect on setting would be the addition of turbine blades in intermittent (owing to screening from the built environment and planting) and very distant views in an arc from south to south by southwest. The form and layout of the township in which they are located would be unaffected.

Significance of Effect

7.11.37 The key elements of these two buildings' setting, Barvas' village layout and immediate surroundings of open pasture and moorland, would be unchanged. Furthermore, the visibility of the proposed turbines would be very distant and intermittent and the localised sense of dominance presented by Barvas Kirk would be unchallenged. As such, the magnitude of change as a result of the Proposed Development is considered to be negligible. The effect on these assets would therefore be not significant.

Calanais, Breasclete and Garynahine

7.11.38 The Calanais group of monuments comprise a number of prehistoric stone-built ceremonial features located in the areas around Calanais and Breasclete townships in addition to Garynahine Lodge. The monuments discussed and assessed in this grouping include the following Scheduled Monuments of national importance:

- Calanais standing stones (Calanais I, SM90054);
- Ceann a'Gharaodh (Calanais II, SM5433);
- Cnoc Filibhir Bheag (Calanais III, SM5437);
- Sron a'Chail (Calanais IV, SM5457);
- Airidh nam Bidearan (Calanais V, SM6018);
- Cul a'Chleit (Calanais VI, SM6018);
- Bheinn Bheag (Calanais XI, SM5499).

7.11.39 More recent structures located within the area also considered in this assessment comprise the following:

- Calanais tea-rooms category B-listed building (LB18656);
- Griomarstadh Kennels category B-listed building (LB19267);
- House at Linsiader, category C-listed building (LB19268).

Importance and Present Setting

7.11.40 Calanais standing stones (SM90054), a Scheduled Monument of national importance, are situated in an area of pasture on the edge of Calanais village, on the west coast of Lewis. The overall layout of the standing stones recalls a distorted Celtic cross; there are thirteen primary standing stones that form a stone circle with a long approach avenue of stones to the north and shorter stone rows to the east, south and west. A later burial cairn has been constructed at the centre of the stone circle, and the layout of the stones has been modified a number of times in the past. It is considered that the stones may have formed a calendar system based on the position of the moon rising over a range of hills to the south, particularly the 'Old Lady of the Moors' hill range. The site is a Historic Scotland Property in Care and is a major visitor attraction on the island. The current setting of the asset and other assets in the "Calanais group" is effectively characterised in the Calanais Standing Stones Setting Document (HES 2014, 23–24) as comprising the following:

- The topographic location of the monuments and their relationship with the wider landscape; particularly their extensive outward views towards the horizon which include the mountain ranges that are visible on the skyline;

- The extensive views towards the monuments from the wider landscape; especially when this is an element of the physical prominence or role the monument plays;
- The inter-visibility between the monuments; these views are an important part of how they were intended to be seen and used;
- The possible routeways between the Calanais monuments, both terrestrial and maritime. For instance, the movement across and between the sites from the north-east, from the south-east and from the west;
- The current landscape character in which the monuments sit; a relatively open rural landscape incorporating some low-lying and scattered buildings, with only a few larger structures visible in the distance to the east;
- The landscape character when the monuments were constructed. While this is a modern landscape, where there is a surviving concentration of monuments (as at Stonehenge, Orkney or Calanais), they can rightly be seen as the surviving fragments of past ritual landscapes. The impact of developments on the settings of such rare and sensitive complexes requires careful consideration;
- Other non-visual characteristics that contribute to the setting of the monuments; for instance, the sensory experience as one travels from one site to another across the landscape which incorporates an appreciation of light, weather conditions, the colour and texture of the monuments, sound, etc;
- Other more intangible qualities that contribute to the sense of place that can be gained from being at one of the monuments; for example, the spiritual associations that people have with the stones themselves, as well as the relationship the monuments have with the wider landscape (e.g. the movements of the moon in relation to the mountain ranges).

7.11.41 Two other Scheduled Monuments located nearby are not included in the ZTV but have been considered as important elements in the setting of Calanais stones. These are Ceann a'Gharaodh, or Calanais II (SM5433) and Cnoc Filibhir Bheag, or Calanais III (SM5437). Both are smaller stone circles at a lower elevation than Calanais I, located on elevated land to the north of Loch Ceann Hulabhaig. These monuments share a visual relationship with one another in addition to Calanais I and partly define the approach to Calanais I from the east through partial visibility from the roadside.

7.11.42 Four additional Calanais group monuments are located within the ZTV and their settings are thus considered here. Sron a'Chail, or Calanais IV is a Scheduled Monument of national importance (SM5457). This comprises a stone circle and cairn located on a hilltop immediately east of the B8011 road, with views across Loch Ceann Hulabhaig to the west, north toward Breasclete and eastward toward the Lewis interior. A visit to the asset noted a directed path approach from the roadside and similar subservient location of the stone circle and cairn to an outcrop of rock as observed in Calanais I and Calanais III. The setting of this asset is bound up with the spatial relationship to other megalithic remains in the area (though lacks a clear visual relationship with Calanais I) in addition to a high position in the landscape, makes a positive contribution to its understanding. On the eastern side of the B8011 road, Airidh nam Bidearan, or Calanais V (SM6018) is a group of standing stones interpreted as the remains of a prehistoric stone circle. These are located on a hillside declining to the northeast with open views over grass and moorland to the Isle of Lewis interior and a presumed uphill approach through grazing land to the west.

7.11.43 Further to the east, Cul a'Chleit or Calanais VI (SM6019) is a monument consisting of two standing stones plus other large stone slabs which may represent the fallen stones of a larger setting. The relatively open landscape in which this is located (375m southwest of Loch Cul a'Chleit) suggests a setting consisting of views in all directions to medium distance across rough moorland. The final

"Calanais group" monument considered here is Bheinn Bheag or Calanais XI (SM5499) on the eastern outskirts of Breasclete township. This monument is a small burial cairn of prehistoric date, situated on a small local summit at the junction of two crofts. The cairn is 3.2m in diameter and has a discontinuous kerb of large stones around its perimeter. This may once have been a continuous kerb, as 4 of the 7 kerb stones surviving are contiguous. Small apparent shielings are also covered by the scheduling. The monument's hillside location affords views mainly to the south and also to east and west, inclusive of the Lewis interior and the area including the Development Site. The longer views primarily take in crofting and open grazing land, and Bheinn Bheag appears to be the only monument in the Calanais group from which most of the other Calanais monuments can be seen to the south (HES 2012, 19). At the western edge of Breasclete, Cnoc a'Phrionnsa (SM5382) is a Neolithic chambered cairn occupying a hilltop oriented to an approach from the A858 roadside and westward views over the sea inlet.

7.11.44 Listed buildings within the ZTV in this area comprise the Calanais tea-rooms (Category B, regional importance, LB18656), Griomarstadh kennels (Category B, regional importance LB19267) and a house at Linsiader (Category C, local importance LB19268). The tea-rooms are situated 50m north of the Calanais stones/Calanais I and comprise a traditional Hebridean-type cottage, formerly used as a tea-room and presently disused and in a state of disrepair. The setting for this building comprises its roadside location within the Calanais township, adjacent crofting plots and views toward the stones to the south and the sea inlet to the west. This setting is considered to make a positive contribution to the significance of the asset. The Griomarstadh kennels' setting is defined by their position on the eastern side of a sea-inlet and associated views across. The Linshader House has a similar defined setting in addition to its relationship with surrounding existing buildings and views north to Calanais. The settings of both of these latter assets contribute to their significance through association and juxtaposition with the prehistoric remains and through siting these assets in the distinctive island landscape of Lewis.

Change to Setting

7.11.45 The proposed turbines would pass in and out of views to the east from Calanais standing stones, Sron a'Chail and Airidh nam Bidearan, to the east from Griomarstadh Kennels and the house at Linsiader, to the east and north east from Cul a'Chleit and to the southeast from Bheinn Bheag and Cnoc a'Phrionnsa.

7.11.46 Visibility of turbines from different areas of the asset group would vary, with the clearest views from the core of the asset group would be from elevated parts of the asset group at the northern end of Calanais I. From here there would be blade tip visibility of up to 20 turbines at a minimum distance of 13.25km (**Figure 6.40**). Turbines would primarily appear in the part of the view where woodpole electrical overheads bread the horizon, and would be of similar or smaller scale to these existing elements of the view, The underlying topography would screen views fully from Calanais II and III, partially from Calanais IV, V, VI and XI. In all these views, the Proposed Development would be visible behind the hills to the east of the asset group.

7.11.47 Turbines would not be visible in any views of the asset group from the south, east or north, and would appear only as very distant elements of the background, beyond the hills to the east in views from the west. Views from immediately west of the asset group are limited by the fall of the ground towards Loch Rog and views of the asset group from the west are consequently primarily from close to it, where the proximity of the assets provides them with a sense of relative prominence, or are more distant views from the west side of Loch Rog. The topographic location of the assets means that there would not be direct juxtaposition of the assets and turbines in views from around the asset group.

7.11.48 Turbines would be visible as very distant and peripheral elements of the background in views from Calanais I to Calanais II and Calanais III. In these views, the viewer would need to focus away from the direct visibility of these assets below the horizon and to the north. Turbines would not be visible in other views between assets in the group due to the orientation of these views away from the east. Where turbines would be visible in views of assets, there would not be direct juxtaposition and the relative prominence of the much closer heritage assets would mean that views of turbines would remain secondary to those of the heritage assets.

7.11.49 Visibility of the Proposed Development when passing between the monuments in the asset group would vary depending on the location, with turbines passing in and out of visibility, and the orientation of the viewer. In general, turbines would not be visible in views of the assets within the group the principal approach to Calanais I from the east and as the viewer moves from north to south within the group. Views of the Proposed Development from the sea around Calanais would be very limited, particularly in views from the west where the underlying topography would limit visibility.

Significance of Effects

7.11.50 The general landscape context of most of the assets and perception of remoteness would remain unchanged. The effects of Proposed Development against the key elements of setting identified in the Calanais settings document are considered as follows:

- Relationship with the mountain ranges that are visible on the skyline:
  - While turbines would be visible in views to the hills to the east of the asset group, they would remain contained behind and be partially screened by this higher ground. Turbines would not be visible in the more dramatic views of the mountains to the north and south of the asset group.
- The extensive views towards the monuments from the wider landscape;
  - Turbines would be visible only as elements of the background to views of the assets from the west and would not be directly juxtaposed with the assets in views from outside the asset group.
- The inter-visibility between the monuments:
  - The Proposed Development would not be juxtaposed in views between the assets within the asset group, and would appear only on the periphery of views from Calanais I to Calanais II and Calanais III.
- The possible routeways between the Calanais monuments:
  - Visibility of turbines from the sea would be very limited and turbines would pass in and out of visibility in views as the viewer moved around the asset group. In all views, turbines would remain contained behind higher ground to the east.
- The current landscape character in which the monuments sit:
  - the location of the Proposed Development means that they would not directly impinge on the present landscape in which the Calanais group is situated. While turbines would be visible, this visibility would not affect the sense of Calanais being located in a distinctive island landscape setting. Visibility of the Proposed Development would add a distinctively modern element to some views, but the lack of prominence of these features means that the existing historic character of the landscape in which Calanais is located would remain unchanged.
- The landscape character when the monuments were constructed;

- The limited visibility of turbines would not affect the viewer's ability to make the interpretative and imaginative judgements that would allow for a sense of connection to and understanding of the siting of the asset group within past landscape on an intellectual or emotional level.

- Other non-visual characteristics that contribute to the setting of the monuments;
  - At the distances involved, the visibility of the Proposed Development would not affect this sensory appreciation of the textures, colours, sounds and smell of the assets. The distance of the turbines from the asset group and the angle of the view means that turbines would not be uplit by low sun in views from the asset group, and the grey finish of the turbines means that no change to texture would arise.

- Other more intangible qualities that contribute to the sense of place that can be gained from being at one of the monuments:
  - In general, the intangible aspects of the asset group would not be affected. The location of the Proposed Development also means that they would not intervene in any solar alignments, and the separation distance means that they would unlikely to discernibly intervene in any lunar alignments.

7.11.51 In the case of Calanais stones/Calanais I, the turbines would solely affect views to the east, in effect appearing behind the ridge of hills present at the edge of the topographic bowl which the monument overlooks in this direction. Turbines would be a recognisably modern element within the landscape, but would appear as very distant features and would not be directly juxtaposed with any views of assets within the group from other heritage assets. Visibility and experience of the short and middle-distance views in this direction would be unaffected, and the perception of the stones as a dominant feature within these surroundings, with an open view toward the same would not be fundamentally altered. The development would comprise a new, visible element being added to views eastward. However at 13km distance from the asset, the Proposed Development would have limited prominence. The integrity of the setting of the asset would not be affected and the magnitude of change would be low, giving rise to an effect that would be not significant.

7.11.52 In Sron a'Chail/Calanais IV, the turbines would appear partially screened in long views behind hills to the east/northeast. As in the case of Calanais I, the key views oriented in other directions toward Loch Ceann Hulabhaig and north and south would be unaffected, as would eastern views over moorland in the middle distance. The sense of occupying a prominent place in the landscape would remain unchallenged and the introduction of turbines into the long distance views from this asset would give rise to a change of low magnitude. The integrity of the setting would not be affected and the effect would be not significant.

7.11.53 With Airidh nam Bidearan/Calanais V, key views from the monument looking north and south following the stone alignment would be unaffected. Views to the east would be affected in a similar way to Sron a'Chail/Calanais IV through the addition of a long-distance, background visual element to these views. The integrity of the asset's setting would not be affected by this and the magnitude of change is therefore assessed to be low, giving rise to an effect which would be not significant.

7.11.54 In Cul a'Chleit/Calanais VI, the monument's position in a lower-lying area of moor/grassland increases the screening effect of hills on long views to the east. Only views eastward from the monument would be affected by the visibility of distant turbines partially screened behind hills. As the principal aspect of the setting for this monument is the perception of the surrounding landscape as open and bare land, the addition of such a long-distance element would not affect the integrity of the setting. The magnitude of change is assessed as low, giving rise to an effect that would be not significant.

7.11.55 In the case of Bheinn Bheag/Calanais XI, key views south toward the other Calanais monuments would be unaffected as would short and middle-distance views in all directions. The monument's orientation toward the south suggests that this is the key view. The addition of turbines in the far distance would be into minor views to the east and south east. The integrity of the setting would not be affected and the magnitude of change is assessed as low. This would give rise to an effect which would be not significant.

7.11.56 The relative lack of prominence of the turbines in very long views of and from the listed buildings within the Calanais group means that any change in the settings of the Calanais tea-rooms (Category B, regional importance, LB18656), Griomarstadh kennels (Category B, regional importance significance LB19267) and a house at Linsiader (Category C, local importance LB19268) would be of negligible magnitude and would give rise to an effect that would be not significant.

Druim Dubh

Importance and Present Setting

7.11.57 The scheduled remains of Druim Dubh stone circle (SM5504), a heritage asset of national importance, survive on a small hillock immediately north of the A895 and opposite the derelict Halfway Garage and associated vacant residential property. The site comprises seventeen fallen megaliths which are partially buried under peat. Research carried out by Margaret and Ron Curtis in the early 1990s indicates that the stones had once formed an elliptical stone circle. Their study suggests that the stones were originally felled in antiquity, perhaps when the stone circle was 'laid to rest' (Curtis 1996). As with many of the stone circles on Lewis, it is speculated that the monument was once formed to observe celestial movements linked to the solstices; the sun and moon setting points, particularly transects through the southern sky. The monument appears to be an isolated feature in this area of Lewis, with no intervisibility to any other known stone circles or other monumental archaeological sites. Only parts of the stone circle are visible, these having been revealed by peat cutting, and the monument is very ephemeral, the low-lying remains being difficult to distinguish from the surrounding peatland.

7.11.58 The A859 public road runs immediately past the southern edge of the monument and two rows of electricity pylons are present immediately north of the monument. These pylons originally ran across the site but were moved to avoid it in the 1990s. It is difficult to gain an understanding of the layout of the Druim Dubh stone circle in its current state of preservation and its current setting adds little to the understanding or appreciation of it. The garage, wood and house immediately to the east of the asset are prominent modern features, and turbines at Beinn Greaigg, Pentalnd Road, Creed Business Park and Arnish Moor are also visible with varying degrees of prominence. Views northward from its hillock location into the Development Site, reflect its prominent position in the surrounding landscape and provide a sense of the distinctive island landscape, while the prominently visible and discernible elements of the overhead lines and the road are detracting elements. Views to the sunrise and sunset alignments to the south provide a sense of understanding of what this asset may have meant, but in the absence of visible elements of the stone circle, it is difficult to understand how these alignments may have related to the asset.

Change to Setting

7.11.59 The Proposed Development would result in the addition of turbines to much of the view north from the asset in an arc from north by northwest to north by northeast in relative close proximity (the closest turbine, T7, would be 915m to the north by northwest). The turbines would appear behind the existing electrical overhead lines, and like those lines would intervene in, but not preclude, views of hills in the northern distance. The perception of change in elevation in the short-middle distance from the hillock on which the monument is situated would be unaltered. Views to the east, west and south would be unchanged. The magnitude of change would be reduced by the effective movement of turbines T8 and T9 from the scoping alignment and the westward shift of the array, meaning that the current alignment would visibly recede from the viewer at Druim Dubh, reducing the perceptual prominence of the array.

Significance of Effects

7.11.60 The addition of turbines from the middle-far distance would alter much of the views northward from Druim Dubh, becoming dominant features in the foreground. This would be a medium magnitude of change which would give rise to a **significant** effect. This effect would be broadly equivalent to that presented by the Consented Development. As the contribution of setting is primarily restricted to the topographic situation of the asset and the general landscape context, which would not be affected by the visibility of the proposed turbines, the integrity of the setting would not be affected.

Gress: Cairn, Lodge and Souterrain

Importance and Present Setting

7.11.61 Three heritage assets are included within the ZTV in this area, each of distinct period and function. Their setting can broadly be categorised as contiguous with the coastal setting of Gress township.

7.11.62 Gress Lodge and an associated outbuilding to the rear are both covered by a Category B listing (LB18674) as an asset of regional importance. The assets form part of a group of substantial buildings including a corn mill. The buildings are of 19th century appearance and comprise a 2-storey, 3 bay house and free-standing single storey double pile block. The setting of these assets consists of their relationship to the nearby Gress township, road layout and views eastward toward the sea which locate these assets in a distinctive island landscape.

7.11.63 The Gress Lodge souterrain (SM5701) is a Scheduled Monument and heritage asset of national importance covering a souterrain, or storehouse of iron age date buried below the surface of land in front of Gress lodge with the exception of its seaward side, which is exposed and subject to marine erosion. The brief exposure revealed a narrow, curved, passage leading back from the shore that gave access to a circular chamber, 3m across and roofed with flagstones. From this chamber a further passage led northwest for 15m to a second circular chamber, and from this a third passage led northeast to a third chamber. The souterrain's setting has been truncated by later development, and largely consists of the shoreline it occupies. This provides a perceptually remote and tranquil location which accords with modern perceptions of an appropriate setting for a prehistoric structure and locating the asset within the distinct island landscape.

7.11.64 Carn a'Mharc (SM1660) is a Scheduled Monument and heritage asset of national importance covering a chambered cairn, located 2.9km northwest of Gress Lodge. The cairn is in open moorland close to a stream and Loch a'Chairn. A point of access could not be ascertained to this isolated monument; though topographic data, mapping and aerial photography shows it on a southwesterly slope overlooking a river running northwest-southeast to Gress. This indicates a similar setting to Dunan chambered cairn, characterised by open moorland surroundings and proximity to running water. This setting provides a perceptually remote and tranquil location which accords with modern perceptions of an appropriate setting for a ruinous structure and locates the asset within the distinct island landscape.

Change to Setting

7.11.65 The Proposed Development would result in the visibility of turbine blade tips in the very distant view, localised to the southwest from both Gress Lodge and the Souterrain, subject to localised screening by existing buildings as one moves through and around these. The closest turbine theoretically visible would be no 34, 12.3km southwest of the Gress Lodge building. Views eastward toward the sea in addition to the north, much of the south and northwest would be unaffected. The relationship between both Gress Lodge and the souterrain and the surrounding township would be unaltered.

7.11.66 From Carn a'Mharc, the Proposed Development would result in turbine blade tips visible as background features in long views to the southwest, with turbine no 33 the closest to the Scheduled Monument at 11.8km. This would be a focused effect on views in one particular direction. Other views westward, eastward, north and south would be unaffected and the Proposed Development would result in no change to the area of moorland in which the cairn is situated.

Significance of Effect

7.11.67 Gress Lodge's setting is largely characterised by its proximity to the sea, spatial relationship to Gress township and views toward the both. The souterrain, being a low-lying and largely functional feature of its period has a setting largely characterised by its proximity to the sea and a spatial relationship with the Gress cemetery souterrain (SM5740) 365m to the south. With regard to Carn a'Mharc, the turbine blades would be at such a distance as to be a non-prominent element in long views to the southwest and the monument's primary setting and prominence derives from its location in an open landscape and proximity to the nearby river.

7.11.68 The changes outlined to this asset group are assessed as of negligible magnitude, resulting in an effect that would be not significant. The integrity of these settings would remain unaffected.

Iolaire Memorial

Importance and Present Setting

7.11.69 The memorial to over 201 victims of the wreck of the Iolaire on New Years' Day 1919 has strong local significance with resonance for a tragedy affecting much of the island community at the time. The memorial was dedicated in 1958 and memorial services held in 1999, followed by the centenary ceremonies in January 2019. The memorial monument comprises an inscribed stone pillar located 3km southwest of Stornoway town overlooking the Beasts of Holm, the rocks upon which the Iolaire was wrecked (this location being marked with a stone pillar of its own). The setting value of this monument is linked in part to an intangible sense of heritage, and chiefly comprises the path approach toward the monument in addition to views south from the headland to the Beasts of Holm, out to sea and west to Arnish point and Stornoway harbour. The position and views from the monument consist of a mixture of presentations from open water to rough grassland to visibly modern urban areas, with passing vessels in the approaches to Stornoway harbour providing a visual focus. This invites contemplation of the disaster in a manner echoing that of the Stornoway War Memorial (https://digital.nls.uk/learning/iolaire/en/aftermath.html). The setting of this asset is also dependent on non-visual sensory perceptions, including the sound of the wind and waves breaking on the rocks. These aspects of loss, remembrance, contemplation and the link between the remembered past and the present combine with the exposed and specific location of the monument to make its setting particularly valued and sensitive.

Change to Setting

7.11.70 The Proposed Development would be visible in views inward to Lewis past Stornoway harbour in an arc from west by northwest to the northwest. In these views, they would comprise a background element of a long-distance view (the closest turbine, T7 is 6.8km west of the monument). These views would also take in the modern development around Stornoway harbour, which, as the intended destination of the Iolaire, would be the focus of views in this direction. Views to the south, north and east would be unchanged as would views from the approach to the monument.

Significance of Effects

7.11.71 The visibility of turbine blades in the background of views westward from the Iolaire memorial would not comprise a discernibly adverse effect as the visual surroundings looking outward from the monument are very much varied in nature and, as with the Lewis war memorial, rely on perception of a living, not static, landscape. The non-visual sensory perceptions of sound and the key views to the wreck site itself would not be affected. Further to this the intangible contemplative qualities of key views east and south of the monument and its spatial relationship with the Beasts of Holm would be unaffected. The Proposed Development would result in a change of negligible magnitude, resulting in an effect that would be not significant.

Lews Castle and Lady Lever Park

Importance and Setting

7.11.72 Lews Castle (LB18677), a Category A listed building and heritage asset of high/national heritage value was constructed in the mid-19th century by James Matheson on the west side of Stornoway town. The castle forms part of the Lews Castle and Lady Lever Park Inventory GDL and sits within enclosed policy woodland. Its crenellated towers are visible above the woodland policies, across the harbour, from Percival Square in Stornoway and this view can be seen time and again in leaflets, books and posters promoting the Island. Several associated listed buildings and structures, including several lodges (including LBs 18815, 18816, 18817) and driveway bridges (such as LB18827) are also present within the GDL.

7.11.73 In 1918 Lews Castle and its surrounding policies (improved grounds surrounding the house) were bought by Lord Leverhulme who gifted the Castle to the Stornoway Parish in the early 1920s. In the 1950s the Castle became a college and a new complex of campus buildings was built within the original walled garden of the castle; today the castle stands next to a complex of modern campus buildings. The woodland policies surrounding the castle and forming the Inventory GDL were planted at the same time as the construction of the castle. Large quantities of soil were brought to the site in order to encourage tree growth; the woodland policies contrast with the surrounding open treeless moorland and create an area of enclosed parkland and policies.

7.11.74 The Inventory GDL has, however, undergone much modification since its original conception. The parkland of the Lady Lever Park, which lies to the north of the castle, now forms the Stornoway Golf Course. A large quarry (Marybank Quarry) has been excavated into the west side of the GDL policies and the castle forms part of the Lews College Campus. The Stornoway Trust manages the site and the grounds are open to the public.

7.11.75 The main views from the castle and the Inventory GDL are particularly concentrated on Stornoway town, and the town's harbour area to the east. There are no apparent specific avenues or vistas looking out from the GDL westwards to the surrounding landscape, although panoramic views are afforded from Gallows Hill (Cnoc na Croich) (see **Figure 6.27**), which lies in the southern area of the Inventory GDL, taking in Stornoway, the eastern coast of the Island, and inland across open moorland. Lews Castle is a Category A Listed Building and its associated GDL is of high heritage value. The current setting of the castle, its other associated buildings/structures and the surrounding GDL makes a positive contribution to their understanding and appreciation.

7.11.76 The setting of the inventory GDL is more difficult to understand and appreciate. In views from Stornoway, the GDL provides a scenic backdrop to views from the town, and the link between the GDL, town and harbour contributes strongly to the setting of the GDL. To the east, however, the margins of the GDL and its immediate surroundings are characterised by industrial and extractive industries, and the woodland planting appears less congruous with the landscape of the interior of the island. Consequently, the positive contribution of setting to the GDL is largely restricted to its interaction with Stornoway harbour.

7.11.77 The remains of a large prehistoric chambered cairn, a Scheduled Monument of national value (SM6550) stand on the summit of Cnoc na Croich. The cairn now forms part of the Lews Castle and Lady Lever GDL that surrounds Lews Castle. As part of the landscaping for the GDL in the 19th century, woodland was planted around the cairn and a path was laid around its eastern side. In addition, a drystone cairn was built at the northeast edge of the cairn, in commemoration of a royal visit to the island in 1902. There are long distance views out to the surrounding landscape in all directions from the cairn. The two Aird Thunga cairns, Dunan chambered cairn (SM1663) and Allt an-t-Sniomh, chambered cairn (SM5330), which lie approximately 5 kilometres to the northeast, may possibly be contemporary with the Cnoc na Croich cairn and have deliberate intervisibility between the sites. There is no intervisibility between the cairn and the stone circle present at Druim Dubh (SM5504), views to which are obstructed by a natural rise in topography to the west. The current setting of the cairn makes a positive contribution to its understanding and appreciation, although its location within policy woodland obscures the viewer's ability to understand interpretations of its intended or 'contemporary' landscape setting.

Change to Setting

7.11.78 The Proposed Development would result in the addition of additional turbines as background elements to views westward from certain topographic highpoints within Lady Lever Park, largely obscured from view by the presence of planted trees. In views of the castle from Stornoway town centre, which take in the harbour, castle rooftops and surrounding woodland policies, turbines would be visible but set back from the castle as a prominent townscape feature. From Cnoc na Croich, turbines toward the north of the Proposed Development would be perceptible, though the presence of tree planting in much of the area to the immediate west of the cairn would screen them in some views from the asset and in views of the asset from the east.

Significance of Effects

7.11.79 Lews Castle and its associated buildings/structures all lie within the Lews Castle and Lady Lever Park Inventory GDL, and it is the enclosed woodland policies which form the setting for these buildings. The nearest turbine (T16) would be located 2.2km to the west of the Inventory GDL and 3.5km from the castle itself. The enclosed woodland surrounding the castle and other associated buildings limits visibility out to the surrounding landscape and to the proposed turbines. It is therefore considered that the Proposed Development would have little effect on the immediate setting of the castle and associated buildings; and the change on their settings is assessed to be of negligible magnitude resulting in an effect that is not significant.

7.11.80 The effect of the Proposed Development on the setting of Lews Castle and Lady Lever Park GDL itself would be, through the addition of a new utilitarian element in westward views (where visible), a reinforcement of the contrast between the parkland and its surroundings. This would not affect the primary orientation of views out of the park toward Stornoway town and harbour and the change would be of negligible magnitude, resulting in an effect that would be not significant.

7.11.81 With regard to Cnoc na Croich, the key views from this cairn are toward the east over Stornoway harbour, south out to sea and north toward hills at the northern extent of Lewis past Stornoway. The approach to the monument is effectively contiguous with the sharp topographic relief and woodland nature of Lady Lever Park. Some turbines would, however, be visible from the asset as the viewer moves around it. The change as a result of the Proposed Development is assessed as of low magnitude and would therefore give rise to an effect that would be not significant.

Marvig School and Schoolhouse

Importance and Setting

7.11.82 The Marvig school and school house is Category B-listed building and a heritage asset of regional importance (LB13335) comprising two separate buildings now combined, built subsequent to the Education (Scotland) act 1872. The building is set on a hillside overlooking a loch to the north. The setting consists of views north and an association with small village buildings neighbouring to the south. This setting makes a positive contribution to the significance of the building through historic and functional links to the village community which it was built to serve.

Changes to Setting

7.11.83 The Proposed Development would result in the addition of turbines as a background feature in long-distance views to the north by northwest, though this would require a change in focus by the viewer from the key view of the loch to the direct north of the building. The closest turbine would be T7, 12.7km to the north by northwest of the building. Views in other directions would be unaffected, and the Proposed Development would result in no change to the village setting of the school buildings.

Significance of Effect

7.11.84 The very distant views of turbines in the background of minor views from the asset would give rise to a negligible magnitude of change, an effect that is not significant.

Stornoway

Importance and Setting

7.11.85 Stornoway Conservation Area contains over 90 Listed Buildings, including the Category A Listed Lews Castle (18677), and encompasses part of the Lews Castle and Lady Lever Park GDL. The Conservation Area comprises the harbour area, the urban enclosed town centre, and the contrasting woodland policies of the Lews Castle grounds. Many of the listed buildings and the town layout derive from the 19th and 20th century when the fishing industry was flourishing and the harbour was a major focal point of the town (CnES Town and Planning web-site link). The majority of listed buildings within the Conservation Area are small shops or residential buildings concentrated around the harbour and along Matheson Road in an enclosed setting. There are views from the harbour to the east across the bay to Lews Castle, taking in the castle and its surrounding woodland policies. This view of the castle is iconic of Lewis and used for promotional leaflets and posters. Roads to and from the Conservation Area run along the coast and have views out to the surrounding open moorland and seascapes. The town can also be reached by ferry, and views of the woodland policies surrounding Lews Castle are visible along with glimpses of the town as the ferry swings into the harbour. The Conservation Area is of regional heritage importance and has a current setting that makes a high contribution to the understanding of its layout, primarily through the relationship of individual buildings within the Conservation Area, although views out into the Cala Steornabaigh and towards Lady Lever Park and Lews Castle contribute.

7.11.86 There are various listed buildings within the built-up area of Stornoway town, most of which are included in the Stornoway Conservation Area (see above), others including: Category B Listed the Tower of the Nicolson Institute (LB41742); Category B Listed 7 James Street (LB41696); Category C Listed Springfield Road School Block and adjoining Hall (LB41741), and Category C-Listed Old Co-op Yard Buildings (LB41695), lie on the periphery of the town centre and Conservation Area. They lie within the town and do not have extensive views out to surrounding areas. The setting of these various buildings is within the groups of related town buildings of which they are an integral part. The setting of the individual listed buildings contributes primarily through their relationships with each other and the surrounding, non-designated structures.

7.11.87 The Lewis War Memorial (LB19211), erected in 1920 to commemorate the end of the First World War, stands on a low hillock (Cnoc nan Uan) on the northern edge of Stornoway town within an area of open heathland. The memorial takes the form of a Scottish Baronial Tower which rises to a height of approximately 26m and is a striking and prominent landmark on Lewis. The tower is a visitor attraction and panoramic views can be gained from the tower out to the surrounding landscape in all directions, taking in both the built-up areas of Stornoway town and the flat open moorland landscape of Lewis. The tower is a Category B Listed Building and of regional importance. As a memorial, its siting in the landscape is not fundamental to its purpose, although it has evidently been sited where it is such that it is a conspicuous landmark widely visible in the landscape that affords views of the contrasting landscapes of Lewis, from coastal, small-scale crofting townships to Stornoway town to open moorland and more industrial developments.

7.11.88 Knockgarry (LB18676) is a former Parish Manse which has been much modernised. It forms part of a row of residential properties and stands in a small village setting of Shanndabhaig on the southeast edge of Stornoway town. The main elevation of the house is focused on the Mol Shanndabhaig bay. A large power station, industrial estate and council offices are present around 500m to the southwest of the former manse. The setting of this building is the group of surrounding village buildings of which it forms an integral part. The former manse is a Category C-Listed Building, of local importance.

7.11.89 A multi-phase site including the remains of a promontory fort and later homestead (SM5253) is situated on the summit of Rubha Shilldinish, a small peninsula on the east coast of the island. The peninsula is connected to the mainland by a narrow neck of land. The settlement remains are located in an area of improved pasture; views are gained to the surrounding landscape, particularly focused on the coastline, to the southeast, and taking in the wider seascapes. The setting of the site, which is a Scheduled Monument and of national importance, makes a high contribution to its understanding and appreciation, through providing a perceptually remote and tranquil location which accords with modern perceptions of an appropriate setting for a prehistoric structure and locating the asset within the distinct island landscape.

Change to Setting

7.11.90 The addition of turbines to the west of Stornoway Conservation Area (the closest turbine, T28, being 3.8km west of the westernmost part of it within the ZTV) would present an intermittently visible element of blade tips, partly screened by the plantations in Lady Lever Park. Visual relationships between individual listed buildings or parts of the Conservation Area would be unchanged and the broader, conceptual, setting of the Conservation Area consisting of contrasting environments in all directions (smaller scale townships and suburbs to the east and north, parkland to the west and open land beyond) would be unchanged.

7.11.91 The presence of turbines visible from Lewis War Memorial in an arc from west to northwest (the closest proposed turbine being T20, 3.3km to the west by southwest) would present a clearly visible new element to views in these directions in addition to existing wind farms visible to the west. Views southward to Stornoway and Lady Lever Park, northward to Newmarket, Tunga and beyond and east toward the sea would be unaffected. The presence of turbines would not particularly detract from an understanding of the war memorial itself and they would not significantly affect the immediate landscape of the structure, however, they would result in a discernible change to the wider landscape in which the war memorial sits and would affect the appreciation of the war memorial in landscape views of Stornoway.

7.11.92 The change to setting of Knockgarry would comprise visibility of turbine blades in views westward from the manse in a southwest to west arc. Views in other directions (particularly to the south) would be unaffected.

7.11.93 The promontory fort and homestead (SM5253) at Rubha Shildinish lie over 7km from the nearest proposed turbines and only partial views of the Proposed Development would be experienced from the sites.

Significance of Effect

7.11.94 While turbines may be visible from the Conservation Area, their presence being peripheral in a small number of key views north from the harbour, and would not affect the principal contribution of the interrelationship of built elements of the Conservation Area. The magnitude of change would therefore be negligible and the effect would be not significant.

7.11.95 While turbines would be clearly visible to views from the Lewis War Memorial this would not detract from understanding or appreciation of the memorial itself. The significance of the memorial, aside from its specific architectural value derives from an intangible experience of remembrance. While its siting in the landscape is not fundamental to the purpose of the memorial, the latter (intangible) aspect derives significance from setting through views of Lewis from the monument as a contrasting, dynamic and lived-in landscape. As such visibly active industrial and utilitarian elements occupy such views without compromising the integrity of the setting. The siting of the memorial also grants it significance through setting via its presence in long views of Stornoway town, however, and the presence of turbines within views of the memorial from the east and imposing on the approach from the west, reducing the prominence of the monument in these views. The magnitude of this change would be medium, and effects on the asset via setting would be significant. This effect would be broadly equivalent to that assessed for the Consented Development.

7.11.96 The setting of Knockgarry consists of the building group forming its immediate surroundings, which would not be affected by the Proposed Development. The magnitude of change would be negligible and the effect is considered not significant.

7.11.97 The Proposed Development would not detract from appreciation of the Rubha Shilldinish promontory fort and homestead, and it is considered that the change would be negligible resulting in an effect that is not significant. The integrity of the setting would not be affected.

Trends and Projected Future Baseline

7.11.98 If the Proposed Development was not to proceed, the Consented Development would be constructed. Effects of the Consented Development are set out in the Environmental Statement for that development. The effects of the Consented Development on heritage assets would be broadly equivalent, with significant adverse effects predicted for the Lewis War Memorial at Stornoway and the Stone Circle at Druim Dubh. Other effects of the consented scheme were assessed as not significant.

7.12 Assessment of Cumulative Effects

7.12.1 It is not considered that the addition of the Proposed Development to a baseline including the existing Beinn Ghrideag, Arnish Moor wind farms would give rise to any significant adverse cumulative effects. The location of these developments means that they would not interact with the Proposed Development in a manner that would give rise to adverse cumulative effects.

7.12.2 The potential for the Proposed Development to give rise to potential cumulative effects on the settings of heritage assets in the northern part of the extended Study Area when considered in addition to the consented Druim Leathann Wind Farm was assessed.

7.12.3 The nature of the settings of the heritage assets in this area and the limited visibility of the Proposed Development means that adverse cumulative effects are considered unlikely to arise. Where both developments would be visible, change to setting from either would be limited given the contribution of localised aspects of setting.

7.12.4 The potential for the Proposed Development to give rise to potential cumulative effects on the settings of heritage assets in the Calanais group when considered in addition to the consented Pentland Road Wind Farm was assessed.

7.12.5 The Pentland Road Wind Farm would be visible in some views from the Calanias group but in a perceptually different part of the view to the Proposed Development in views from Calanais and would be discernibly closer and of a different size than the turbines of the Proposed Development. These turbines would therefore remain distinct from the Proposed Development, which would not bring turbines closer to the asset in the viewer's perception. Therefore, no cumulative adverse effect would arise.

7.12.6 Overall, it is considered that the cumulative effects of the Proposed Development in combination with other wind farm schemes in the wider landscape would not be significant, and overall no greater than that of the Proposed Development in isolation.

7.13 Consideration of Optional Additional Mitigation or Compensation

7.13.1 Mitigation of adverse direct effects would be provided by the agreement of a written scheme of archaeological works with the CnES Archaeologist. This scheme would allow for the identification and recording of archaeological features and deposits of geoarchaeological and palaeoenvironmental interest within the Development Site which would otherwise be affected by the Proposed Development. This written scheme of works has been considered as an embedded environmental measure.

7.13.2 As it is very difficult to provide effective mitigation for change to setting, mitigation of these effects has been achieved through design of the Proposed Development. This has included the following key elements:

- Maximising the distance of the Proposed Development from Stornoway and Lady Lever Park and rationalising the composition of turbines in these views;
- Reconfiguration of the turbine array to increase separation and rationalise its composition in views from Druim Dubh; and
- Minimising any increased visibility from the Calanais group.

7.13.3 These measures have ensured that change to setting arising from the Proposed Development has been appropriately considered within the design of the scheme and that effects have been effectively minimised as far as reasonably possible.

7.14 Conclusions of Significance Evaluation

Table 7.6 Summary of Significance of Effects

Receptor	importance of receptor[1]	Magnitude of change[2]	Significance[3]	Summary rationale
Peat workings associated with Stornoway Paraffin Works (MWE4325)	Local	Negligible	Not significant	Loss of limited area of receptor could be effectively mitigated through implementation of an agreed scheme of archaeological works.
Head dyke (MWE145731)	Local	Negligible	Not significant	Loss of limited area of receptor could be effectively mitigated through implementation of an agreed scheme of archaeological works.
Former shielings (MWE146816)	Regional	Negligible	Not significant	Effects may be reduced by use of agreed micrositing allowance. Loss of limited area of receptor could be effectively mitigated through implementation of an agreed scheme of archaeological works.
Achmore Stone Circle – effect on setting through visual imposition on views from asset	National	Low	Not significant	Views from the stone circle are principally focused to the south and away from the Development Site. The approach to, and resultant appreciation of the monument could, however, be affected by the presence of turbines in relatively close proximity.
Aird Thunga				
Allt an-t-Sniomh chambered cairn - effect on setting through visual imposition on views to, from and on approach to asset	National	Low	Not significant	The chief characteristics of the setting of this cairn are the topography of the field in which it is located and spatial relationship with the Dunan chambered cairn to the southwest. The Development Site, being off to the southwest, would not impose on this particular landscape component though the presence of turbine blades in the far distance could affect appreciation of the two assets.
Dunan Chambered Cairn - effect on setting through visual imposition on views from asset	National	Low	Not significant	The chief components of the setting of Dunan chambered cairn are its location on a downward southwestern slope close to a stream and visual relationship such as can be discerned with the Allt an-t-Sniomh chambered cairn to the southwest. Turbine blades may be visible in the far distance during the operational period of the Proposed Development though these would be irrelevant to the integrity of the monument setting.
An Rubha				

Receptor	importance of receptor[1]	Magnitude of change[2]	Significance[3]	Summary rationale
Caisteal Mhic Creacail, chambered cairn, Fleisirin	National	Negligible	Not significant	The setting of this chambered cairn is characterised by its coastal location and associated views across Broad Bay toward Gress and Aird Thunga. The presence of turbines in the Lewis interior would not affect this setting.
Clach Stein - effect on setting through visual imposition on views from asset	National	Negligible	Not significant	Views from the fallen stones comprising this asset are principally to the east and south following localised topography with broader elements of setting consisting of the open nature of the field in which it is situated contrasting with the nearby township and potential former links through alignment with Dursainean although this was not clearly discernible on visiting the assets. The location of the Proposed Development would be largely irrelevant to the setting of this asset.
Cnoc nan Dursainean - effect on setting through visual imposition on views from asset	National	Low	Not significant	The setting of this standing stone is characterised by its situation on a low mound above the north bank of a stream surrounded by moorland in the An Rubha interior. The approach via the stream bank from Garrabost contributes to the setting. The Proposed Development would not meaningfully intrude on the setting of this asset.
Dun Mor,dun , Garrabost	National	Low	Not significant	The setting of this monument is characteristic of promontory forts in that it is comprised of an approach to the monument and views from the monument seaward. In this case, north across Broad Bay. The presence of turbines in long views to the northwest would have little to no impact on the integrity of the asset through this setting.
Dursainean Chambered Cairn - effect on setting through visual imposition on views from asset	National	Low	Not significant	The hilltop location of the chambered cairn affords open views in all directions though its setting is characterised more by its immediate surroundings of moorland/pastoral fields surrounded by townships in the An Rubha context. While visible in the far distance, the turbines of the Proposed Development would not affect the heritage interest of the asset by compromising this setting.
St Columba's Church - effect on setting through visual imposition on views from asset	Regional	Low	Not significant	St Columba's Church's setting is largely defined by its surrounding churchyard and proximity to the sea on the north side of An Rubha immediately east of the isthmus connecting the same to Stornoway. Views west and inland are partially screened by local topography and nearby buildings and understanding and appreciation of the monument are largely derived in setting terms from moving through the surroundings. The Proposed Development would have no effect on this.
Arnish Point				

Receptor	importance of receptor[1]	Magnitude of change[2]	Significance[3]	Summary rationale
Arnish Point - effect on setting through visual imposition on views from asset	National	Negligible	Not significant	The setting of the gun emplacements is characterised by their seaward orientation to the south and the "cut-off" nature of the Arnish Point peninsula in contrast to the modern harbour of Stornoway. The presence of turbines in the far distance would present another element of modern/industrial development and would comprise a non-significant effect.
Arnish Point lighthouses - effect on setting through visual imposition on views from asset	Regional	Negligible	Not significant	The appreciation and understanding of the Arnish Point lighthouse as presented in its setting comprises seaward orientation and its prominence in relation to the approach toward Arnish point and views across the bay. This would not be imposed on by the Proposed Development as longer views north into Stornoway harbour are characterised by a mixture of older and recognisably modern and mixed-use architecture to which turbine blades would add a further, non-adverse element.
Arnish Monument	Local	Negligible	Not significant	The appreciation and understanding of the Arnish Monument as contributed to through its setting rests on its location overlooking Stornoway harbour, which would not be affected by the Proposed Development.
Barabhas				
Barabhas Parish Church	Regional	Negligible	Not significant	The setting of Barabhas Parish Church is characterised chiefly by the field in which it is situated, the township dwellings of Barabhas in close proximity and longer views northward to the sea. This setting would be unaffected by the Proposed Development.
Thatched Roof Garage	Regional	Negligible	Not significant	This building's setting consists of its spatial relationship with other close township buildings to the south and north, with sea views westward and field views eastward. If in any view at all, the Proposed Development would result in turbine blades forming a distant, background element to the southwest and would have no significant effect on this setting.
Bragar Allt na Muilne (Bragar), horizontal water mills	National	Negligible	Not significant	The setting of the water mills is very much localised to their waterside location in open fields to the rear of the nearby township. This setting would be unaffected by the Proposed Development.
Calanais				
Airidh nam Bidearan	National	Low	Not significant	The setting of this hilltop megalithic monument is characterised in part by views over the open landscape to the east, partly framed by rising topography. Visible turbines would affect these long views but the approach to the asset would be unaffected in addition to any visual relationship with other monuments in the area.

Receptor	importance of receptor[1]	Magnitude of change[2]	Significance[3]	Summary rationale
				It is not therefore considered that the integrity of setting would be compromised.
Bheinn Bheag	National	Low	Not significant	This monument's location on a southeastern hillside partly defines its setting by views across a largely open landscape in that direction. The presence of turbines in long views would alter the experience of this landscape character, though framing hills would guard against the integrity of the setting being compromised.
Calanais Standing Stones/Calanais I - effect on setting through visual imposition on views from the asset, the approach to the asset, and approach to linked monuments	National	Low	Not significant	The Proposed Development would be visible in views from the monument eastward. The addition of very distant views of turbine blade tips to longer views into the Lewis interior from the standing stones themselves would present a minimal change to setting. From Calanais I, turbines would be visible against a horizon which is already broken by woodpoles which would appear with greater prominence than the proposed turbines. The landscape to the east of the stones effectively forms a bowl characterised by grassland/pasture with scattered buildings with the horizon, identified in the setting document (HES 2014) as of great importance to the understanding and appreciation of the monument, effectively framed by hills in the far distance. While the Proposed Development would present a visual imposition on this horizon, it is not considered to detract from the integrity of the monument's setting owing to distance and relative lack of prominence. The turbines would not form a dominant feature in this view and would not alter the relationship between the various elements of the Calanais group within the "bowl".
Cul a'Chleit standing stones - effect on setting through visual imposition on views from asset	National	Negligible	Not significant	While turbines would be visible to the east of the asset, the degraded nature of the monument shortens the range of its setting to the surrounding fields and nearby Loch Cul a'Chleit. Turbines in the far distance would have a non-significant effect on this setting.
Cnoc a'Phrionnsa	National	Negigible	Not significant	The setting of this chambered cairn is defined by its location on a hilltop with views over water to the west. The Proposed Development would have no effect on this setting.
Sron a'Chail	National	Low	Not significant	Sron a'Chail's setting is principally defined by its location on a hilltop overlooking Loch Rog An Ear, northwest toward the other Calanais Group monuments, with open views to the east and the uphill approach from the road. Changes in topography toward the Lewis interior would screen most views of turbines and their presence in long views would not affect the integrity of experiencing the asset.

Receptor	importance of receptor[1]	Magnitude of change[2]	Significance[3]	Summary rationale
Druim Dubh Stone Circle - effect on setting through visual imposition on views from asset	National	Medium	**Significant**	The contribution to the understanding and appreciation of this asset through setting is chiefly in the influence of its hillock-top location in providing views across lower land to the north. As numerous turbines associated with the Proposed Development will be in full view of Druim Dubh, the closest turbine being 915m away, the effect is considered to be **significant.** (The ES for the Consented Development assessed this as a **significant** adverse effect).
Gress				
Carn a'Mharc chambered cairn	National	Low	Not significant	Turbine blade tips would appear as a distant, barely perceptible, element to the southwest of the chambered cairn remains. The integrity of the cairn's setting, comprising of its close proximity to a watercourse and location in an isolated field on a downward slope facing south, would be uncompromised.
Gress Lodge and associated outbuildings	Regional	Negligible	Not significant	Gress Lodge's setting is chiefly characterised by its spatial relationship to elements in the close and middle distance: The road to the west, domestic buildings in Gress township and views eastward into the sea at Broad Bay. This would be unaffected by the Proposed Development.
Gress Lodge Souterrain	National	Negligible	Not significant	The setting of the souterrain is heavily truncated and does not include long views save, potentially, east out to sea. The Proposed Development would not affect this setting.
Iolaire Memorial (non designated heritage asset)	Regional	Low	Not significant	The situation of the Iolaire monument is such that views are invited out to sea, to the "Beasts of Holm" rocks upon which the wreck took place and back toward Stornoway harbour. The nature of this setting would not be adversely affected by the presence of turbines in the far distance.
Lews Castle/Lady Lever Park				
Cnoc na Croich - effect on setting through visual imposition on views from asset	National	Low	Not significant	The setting of Cnoc na Croich primarily consists of views across Stornoway harbour and the location of the cairn within Lady Lever Park GDL, incorporating as it does general physical surroundings characterised by tree plantation and an uphill approach to the monument. Much of the views to the west are screened by tree cover and, while the presence of turbines may still be discernible, this would not affect the appreciation or interest of the monument given the existing mixture of surroundings visible in the modern town of Stornoway and parkland.
Lady Lever Park - effect on setting through visual imposition on views from asset	National	Medium	Not significant	The setting of Lady Lever Park is defined by the marked contrast of its planted woodland landscape character and sheer elevation with the open moorland to the west and south,

Receptor	importance of receptor[1]	Magnitude of change[2]	Significance[3]	Summary rationale
				Stornoway town centre to the east and more dispersed built environment (industrial and township) to the north. Turbines would effectively form another part of modern contrast with this environment and would not result in a significant effect on the asset.
Lews Castle - effect on setting through visual imposition on views from asset	National	Low	Not significant	The setting of Lews Castle comprises the Lady Lever Park inventory GDL and Stornoway town itself. While turbines would be visible from the building at its maximum height these would not impose on the understanding or appreciation of the building through setting as contrasting environments are already present in the surrounding areas.
Knockgarry parish manse	Regional	Negligible	Not significant	The manse's setting is characterised by the close spatial relationship with buildings in its immediate surroundings and would be unaffected by the addition of turbines as elements of long views to the west.
Stornoway Conservation Area and listed buildings therein – effect on setting through imposition on views from assets	Regional	Low	Not significant	The conservation area is effectively contiguous with the setting, with the addition of views out to sea for listed buildings of the waterfront. The setting of the conservation area includes more open environments on the outskirts of Stornoway in addition to the Lady Lever Park GDL. While turbines may be visible from the conservation area, effects on the understanding/appreciation of the asset via setting would be negligible.
Stornoway War Memorial - effect on setting through visual imposition on views from asset	Regional	Medium	**Significant**	Views from the memorial's hilltop location to the south and west would be affected by the Proposed Development, though the addition of turbines to these views would not necessarily form an adverse effect, largely adding to the impression of a built environment that has developed over time also visible in views from the asset toward Stornoway town, the smaller crofting townships, industrial areas and the open landscape to the interior of the island. Views of the asset, sited for prominence in the landscape, would be affected and this would comprise an adverse effect. (The ES for the consented development assessed this as a **significant** adverse effect)

1. The sensitivity/importance/value of a receptor is defined using the criteria set out in Section 7.9 above and is defined as National, Regional, Local and Lesser.
2. The magnitude of change on a receptor resulting from activities relating to the development is defined using the criteria set out in **Section 7.9** above and is defined as negligible, low, medium and high
3. The significance of the environmental effects is based on the combination of the importance of a receptor and the magnitude of change and is expressed as significant or not significant subject to the evaluation methodology outlined in **Section 7.9**.

7.15 Implementation of Environmental Measures

The embedded environmental measures would be implanted as set out at **Table 7.6**.

Table 7.7 Summary of Environmental Measures to be Implemented – Relating to Historic Environment

Environmental measure	Responsibility for implementation	Compliance mechanism
Agreement of written scheme of archaeological works	*Contractor*	*Planning Condition*

7.16 References

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Crabbe, D (2000) 'The Lewis Chemical Works, a Peat Distillation Venture of the 1860's', Trans Newcomen Soc. 71 (1999-2000), 129-142.

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Historic Scotland (2010) 'Managing Change in the Historic Environment: Setting', October 2010.

8. Ornithology

Non-Technical Summary

The layout of the turbines, road network and associated infrastructure has evolved through the design process, taking environmental constraints to avoid potentially adverse effects on ornithological features into account. Specifically, the layout was designed to avoid possible sensitive lochans used by breeding divers and areas of moorland planted with trees that are preferentially used by hen harrier. The ornithological baseline consisted of a desk study and field surveys from October 2017 – September 2018; surveys carried out over 2015 - 2016 in the north-western area of the Development Site and field surveys conducted in 2010/11 as part of the Stornoway Wind Farm 2012 application.

The desk study identified two European sites and their qualifying features that were taken forward for assessment, Lewis Peatlands SPA and Lewis Peatlands Ramsar. Surveys recorded 25 species listed as qualifying feature of the Lewis and Peatlands SPA, listed on Annex 1 of the Birds Directive, Schedule 1 of the Wildlife and Countryside Act (as amended) (W.C.A.) or species of principal importance on the Scottish Biodiversity list (SBL). Of these, eight were screened in for further assessment.

The assessment has been based on not only the results of the desk study and field surveys, but also relevant published information (for example on the status, distribution, sensitivity to environmental changes and ecology of the ornithological features scoped in to the assessment, where this information is available), and professional knowledge of ecological processes and functions.

For each scoped-in ornithological feature, effects were assessed against the current baseline conditions for that feature during construction, operation and decommissioning.

The initial results of the assessment regarding potentially significant effects were used to inform whether additional baseline data collection was required, together with the identification of environmental measures that should be embedded into the Proposed Development to avoid or reduce adverse effects or to deliver enhancements. This was an iterative process with the results of desk study and surveys informing the requirement for additional scope of works/embedded mitigation. The results of the assessment therefore reflect the final scheme design (i.e. incorporating the environmental measures).

A full assessment, including where appropriate collision risk modelling and population viability assessment, of the screened in ornithological features was undertaken following CIEEM (2018) guidance. No significant effects were concluded for any species or site. A further cumulative assessment was undertaken for golden eagle, white-tailed eagle and red-throated diver, no cumulative significant effects were concluded for any of these species.

A range of environmental measures have been embedded into the Proposed Development to minimise any potential impacts on breeding and roosting birds. Working practices to minimise effects on ornithological features during construction are to be set out in a Bird Protection Plan. This would form part of an overarching Construction Environmental Management Plan and would be implemented under the direction/supervision of an Environmental Clerk of Works. Taking this and other mitigation measures into account, it was concluded that the Proposed Development would not have a significant effect on birds.

8.1 Introduction

8.1.1 This Chapter assesses the likely significant effects[1] of the Proposed Development with respect to ornithology. The Chapter should be read in conjunction with the development description provided in **Chapter 4: Description of the Proposed Development** and with respect to relevant parts of other Chapters, including **Chapter 9: Ecology**, where common receptors have been considered and where there is an overlap or relationship between the assessment of effects. The Chartered Institute of Ecology and Environmental Management (CIEEM 2018) "*Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine*" refer to receptors being 'ecological features', defined as pertaining to habitats, species and ecosystems. However, for the purposes of this EIA Report, for which has a separate ecology and ornithology Chapter has been produced, the term 'ornithological feature' is adopted to differentiate terminology and avoid any confusion between the two Chapters.

8.1.1 Potential effects on European sites[2] are considered with regard to the Conservation of Habitats and Species Regulations 2017 within the Habitats Regulations Appraisal (HRA). A HRA Screening Report/HRA report is provided in **Chapter 8, Appendix 8H**.

8.2 Limitations of this Assessment

8.2.1 The baseline context of the Study Area has been determined on the basis of the following:

- A desk study and field surveys from October 2017 – September 2018;
- Surveys carried out over 2015 - 2016 in the north-western area of the Development Site. Field data collected during this period (pertinent to this assessment) included breeding and non-breeding bird surveys (see **Appendix 8A** for further details).
- Field surveys conducted in 2010/11 as part of the Stornoway Wind Farm 2012 application.

8.2.2 Whilst the baseline data does not include two years of current survey coverage the combination of the single year of full current coverage, desk study (including recent Lewis hen harrier breeding survey results) and historical abundance and distribution data indicates that whilst exact nesting locations may change between years the assessed impacts from any second year of survey data are likely to be of the same magnitude as that presented in this Chapter.

8.3 Relevant Legislation, Planning Policy, Technical Guidance

Legislative Context

8.3.1 The following legislation has been considered in the assessment of the effects on ornithological features[3]:

[1] In this Ornithology Chapter, the term "potentially significant effects" is used in the sections prior to the "scope of the assessment" (**Section 8.8**) being determined, as it accords with CIEEM guidance. The term "likely significant effects" is used once the scope of the assessment has been determined. The use of this term is not to be confused with Likely Significant Effects (LSEs) as used in the context of the Habitats Regulations Appraisal.

[2] European sites include Special Protection Areas (SPA), Special Areas of Conservation (SAC), candidate SACs (cSAC) and Sites of Community Importance (SCI); these sites are collectively referred to as Natura 2000 sites. Potential SPAs (pSPA), possible SACs (pSACs), Ramsar sites and proposed Ramsar sites should also be considered in the same manner in accordance with national planning policy.

[3] The Chartered Institute for Ecology and Environmental Management (CIEEM) refer to biodiversity receptors within technical guidance as ecological features, though the term ornithological receptors has been adopted for the purposes of this Chapter.

- Directive 2009/147/EC on the Conservation of Wild Birds (the codified version of Council Directive 79/409/EEC as amended) (Birds Directive);
- Conservation of Habitats and Species Regulations 2017;
- Wildlife and Countryside Act 1981 (as amended);
- Nature Conservation (Scotland) Act 2004;
- Wildlife and Natural Environment (Scotland) Act 2011;

Planning Policy Context

National Policies

8.3.2 A summary of the relevant national planning policies is given in **Table 8.1**.

Table 8.1 National Planning Policy Issues relevant to Ornithology

Policy Reference	Policy Issue	Key Sections in which Considered
SCOTTISH PLANNING POLICY (2014)		
Valuing the Natural Environment Subject Policy (paragraphs 193-218)	The 'Valuing the Natural Environment' subject policy within the Scottish Planning Policy (SPP) (2014) sets out detailed policy provisions relating to the protection and enhancement of different types of natural resources and natural heritage assets, as detailed below: • Natural Heritage Planning Principles (paragraph 194); • Protecting Designated Sites (paragraph 196); • Development Management Decisions (paragraphs 202-206); • Protected Species (paragraph 214).	**Section 8.7 and Appendix 8A**
Protecting Designated Sites (paragraph 196)	The SPP requires designated areas and sites to be identified and appropriately protected through development plans, without the use of buffer zones (paragraph 196). Within the same paragraph the SPP states that "*the level of protection given to local designations should not be as high as that given to international or national designations*".	**Section 8.7, Appendix 8A Figure 8A.1.1**
Development Management Decisions (paragraphs 202-206)	The SPP states that planning decisions "*should take account of potential effects on landscapes and the natural and water environment, including cumulative effects*". The SPP further states that "*planning permission should be refused where the nature or scale of proposed development would have an unacceptable impact on the natural environment*". It is noted in the same paragraph that whilst effects on statutorily protected sites will be an important consideration, designation "*does not impose an automatic prohibition on development*".	**Section 8.23**
Protected Species (paragraph 214)	The SPP notes that "*the presence (or potential presence) of a legally protected species is an important consideration in decisions on planning applications. If there is evidence to suggest that a protected species is present on site or may be affected by a proposed development, steps must be taken to establish their presence. The level of protection afforded by legislation must be factored into the planning and design of the development and any impacts must be fully considered prior to the determination of the application*".	**Section 8.17 Section 8.18 Appendix 9B Appendix 8C Appendix 8D**
LOCAL PLANNING POLICY		

Policy Reference	Policy Issue	Key Sections in which Considered
Outer Hebrides Local Development Plan (LDP) (2018)	The adopted Outer Hebrides LDP policies of relevance to this Chapter are: • Policy NBH2 Natural Heritage (seeks to protect European, national and local conservation areas, protected species, biodiversity and geodiversity).	**Section 8.7, Section 8.8, Section 8.17**
BIODIVERSITY POLICY		
UK Biodiversity Action Plan (UKBAP) / UK Post-2010 Biodiversity Framework (UKBAP)	The UKBAP, produced in 1994 by the UK Government, was a national strategy for the conservation of biodiversity. The UKBAP was updated in July 2012 with a plan which covers the period 2011-2020. This framework is implemented individually by each of the four UK countries. Within Scotland, the UKBAP is coordinated through the Biodiversity Action Reporting System (BARS), which is an online tool which contains a list of Scottish priority habitats and species (The Scottish Biodiversity List [SBL]). All UKBAP species and habitats are listed in the SBL.	**Section 8.7, Appendix 8E**
Scottish Biodiversity List (SBL)	The SBL is a list of flora, fauna and habitats considered by the Scottish Ministers to be of principal importance for biodiversity conservation and its publication was a requirement of Section 2(4) of The Nature Conservation (Scotland) Act 2004.	**Section 8.7, Appendix 8E**
Western Isles Local Biodiversity Action Plan (LBAP)	The SBL is referred to instead of the LBAP as the previous version of the LBAP is no longer relevant.	**Section 8.7, Appendix 8E**

Development Plan Policies

8.3.3 A summary of the relevant development planning policies is given in **Table 8.2**.

Table 8.2 Development Plan Policy Issues Considered within the Assessment of Ornithology

Policy Reference	Policy Issue	Key Sections in which Considered
Outer Hebrides Local Development Plan Adopted Plan (2018)		
Policy NBH2: Natural Heritage	Development which is likely to have a significant effect on a Natura site and is not directly connected with or necessary to the conservation management of that site will be subject to an Appropriate Assessment by the Comhairle. Development which is likely to have a significant effect on a Natura site will only be permitted where: a) an Appropriate Assessment has demonstrated that it will not adversely affect the integrity of the site; or b) there are no alternative solutions; and c) there are imperative reasons of overriding public interest, including those of a social or economic nature; and d) compensatory measures are provided to ensure that the overall coherence of the Natura network is protected. Development that affects a Site of Special Scientific Interest (SSSI) or National Nature Reserve (NNR) will only be permitted where: a) the objectives of designation and the overall integrity of the area will not be compromised; or	**Section 8.8, Section 8.17 Section 8.18 Appendix 8D Appendix 8F Appendix 8H**

Policy Reference	Policy Issue	Key Sections in which Considered
	b) any significant adverse effects on the qualities for which the area has been designated are clearly outweighed by social, environmental or economic benefits of national importance. All Ramsar wetland sites are also Natura sites and/or Sites of Special Scientific Interest and are included in the statutory requirements noted above. Planning permission will not be granted for development that would be likely to have an adverse effect on a species protected under the Wildlife and Countryside Act 1981 (as amended in Scotland) unless the development is required for preserving public health or public safety. For development affecting a species of bird protected under the 1981 Act there must also be no other satisfactory solution.	
	Development proposals should avoid having a significant adverse effect on, and where possible should enhance, biodiversity and ecological interests of the site. Developers are encouraged to assess the impacts of their proposed development on UK Biodiversity Action Plan (BAP) priority species and habitats and Local BAP habitats and species. Developers should refer to the Scottish Biodiversity List for a full list of animals, plants and habitats considered to be of principal importance for biodiversity conservation in Scotland (this list includes all UK priority species).	**Section 8.7** **Section 8.8** **Section 8.22** **Appendix 8E**
Outer Hebrides Local Development Plan – Supplementary Guidance for Wind Energy Developments		
Natural Heritage	All provisions of Policy NBH2 Natural Heritage of the Outer Hebrides Local Development Plan apply in assessing the potential impact of wind energy developments on natural heritage, including those not mapped or expanded upon in this guidance. In addition, the following policy provisions apply to wind farm proposals: International and national sites are identified as areas of constraint and set out in Map 2. In these areas wind farms may be appropriate in some circumstances but 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. It is important to assess whether there are processes or pathways by which a proposal lying outwith a designated site may still influence the sites 'qualifying interests'. For proposals within such 'supporting habitat', further assessment may be required to establish impacts on the integrity of sites. Applicants should refer to 'Assessing Connectivity with Special Protection Areas (SPA)' (SNH, 2016a) which sets out guidance to assess whether there is connectivity between the proposal and the qualifying interests of the site.	**Section 8.17** **Section 8.18** **Appendix 8H**

Technical Guidance

8.3.4 Publications that provide guidance that is relevant to the ornithological impact assessment are listed below.

- Assessing significance of impacts from Onshore Wind Farms outwith Designated Areas (SNH 2018a);
- Assessing Connectivity with Special Protection Areas (SPAs) (SNH 2016a);
- Assessing the cumulative impact of onshore wind energy developments (SNH 2018b);
- Chartered Institute of Ecology and Environmental Management (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Chartered Institute of Ecology and Environmental Management, Winchester;

- Dealing with construction and birds (SNH 2016b);
- Natural Heritage Zones Bird Population Estimates (Scottish Wind Farm Bird Steering Group 2015);
- A review of disturbance distances in selected bird species (Natural Research, 2007).
- Scottish Renewables, SNH, SEPA, Forestry Commission Scotland and Historic Environment Scotland (2015). Good Practice during Wind Farm Construction (3rd Edition); and
- Wind farm proposals on afforested sites – advice on reducing suitability for hen harrier, merlin and short-eared owl (SNH 2016c).

8.3.5 Technical guidance used to define the survey methods or analytical approaches used to inform this assessment are referenced in **Appendix 8B: Bird surveys October 2017-March 2018; Appendix 8C: Bird surveys April – September 2018; Appendix 8F: Collision Risk Modelling, Appendix 8G: SPA CRM and population modelling for red-throated diver,** and **Appendix 8H: Habitat Regulations Appraisal.**

8.3.6 Scientific names for all species are listed in **Appendix 8A** and **Appendix 8B**.

8.4 Data Gathering Methodology

Study Area

8.4.1 The Study Area encompasses the area over which all desk-based and field data were gathered to inform the assessment presented in this Chapter. Due to the presence of multiple ornithological features and many potential effects, the level and type of data collection varies across the Study Area. The "Study Area" comprises:

- The Development Site (as defined in **Chapter 4** and illustrated on **Figure 1.1** and **1.2**);
- The desk Study Area for European sites;
- The desk Study Area for legally protected and notable ornithological features; and
- The field Survey Areas.

8.4.2 The extent of the desk Study Area(s) and field survey area (see **Table 8.3**) were determined based on best practice guidance and a high-level overview of the ornithological features present. The Study Area was defined on a precautionary basis to ensure that, as a minimum, the Zone of Influence[4] (ZoI) relevant to all ornithological features (see **Table 8.9** and **Section 8.7**) were covered during baseline data collection activities.

8.4.3 As the design process has evolved iteratively, the Study Area, and its constituent parts, has been regularly reviewed to ensure that its extent was adequate to enable the assessment of all potentially significant effects on the ornithological features identified. Changes to the initial developable area, or the precise nature of the development, have been reviewed in light of the ornithological features present (which was in turn informed by the data gathering exercise) and the potential effects that could occur. At each stage of design evolution, the extent of the Study Area, including all of its components, was considered against the methodology described in **Section 8.7** to ensure adequate information was available on which to base an assessment.

[4] The ZoI in this context is the area over which an individual ecological feature may be subject to a potentially significant effect resulting from changes in the baseline environment due to the Proposed Development.

Desk Study

8.4.4 A desk-based data-gathering exercise was undertaken to obtain existing information relating to relevant ornithological features noted for their bird interest (**Appendix 8A**); these are statutory and non-statutory biodiversity sites, species of principal importance[5], legally protected species and other conservation notable species that have been recorded over the previous 10 years (i.e. 2009 to 2019). **Table 8.3** lists the data compiled within the desk Study Area, which is the Development Site and the additional areas of search beyond and is shown on **Figures 8A.1.1**.

8.4.5 Where appropriate, data were drawn from existing ornithological records and site information obtained through field surveys conducted in 2010/11 as part of the Stornoway Wind Farm 2012 application and surveys carried out over 2015 - 2016 in the north-western area of the Development Site. Fieldwork undertaken during this period (pertinent to this assessment) included breeding and non-breeding bird surveys.

Table 8.3 Information Relevant to the Desk Study

Ornithological Feature	Example/Description	Study Area
Statutory sites designated under International conventions or European legislation	Wetlands of International Importance (also known as Ramsar sites) and Special Protection Areas (SPAs)2.	The Development Site and within 20km of it.
Statutory sites designated under national legislation	Sites of Special Scientific Interest (SSSIs), National Nature Reserves (NNRs) and Local Nature Reserves (LNRs) with ornithological qualifying features.	The Development Site and within 10km of it.
Locally designated sites	Often termed as Local Wildlife Sites (LWS), County Wildlife Sites (CWS), Sites of Interest for Nature Conservation (SINC)	The Development Site and within 2km of it.
Scottish Biodiversity List; Red listed species[6]; and Legally protected species.	Bird species of principal importance for the conservation of biodiversity in Scotland. Red listed Birds of Conservation Concern (*Eaton et al 2015*). Legally protected bird species include those listed on Schedule 1 of the *Wildlife and Countryside Act 1981* (as amended in Scotland).	The Development Site and within 2km of it.

8.4.6 **Table 8.4** lists the organisations and other sources that have supplied data, together with the nature of that data.

Table 8.4 Sources of Desk Study Data

Source	Summary of Information Provided
SNH's interactive map facility at (https://sitelink.nature.scot/home)	Access to data and information on key protected areas across Scotland.
National Biodiversity Network (NBN) gateway's information service (http://data.nbn.org.uk)	Commercially-available records of protected and/or notable species from within the last ten years.

[5] Scottish Biodiversity List features.

[6] Red listed species for the purposes of this assessment refer to those who, following a review of the status of birds in the UK, Channel Islands and Isle of Man using standardised criteria, were assessed and assigned to the Red list of Birds of Conservation Concern (BoCC). The assessment criteria include conservation status at global and European levels and, within the UK, historical decline, trends in population and range, rarity, localised distribution and international importance (*Eaton et al 2015*).

Source	Summary of Information Provided
Stornoway Wind Farm 2012 Environmental Statement (ES)	Desk based review, breeding and non-breeding bird baseline surveys of the Stornoway Wind Farm ES (2011) together with contextual material regarding the consented wind farm.
Stornoway Wind Farm surveys 2015-2016	Breeding and non-breeding bird baseline surveys of the north western area of the Development Site together with additional updated desk-based review of original ES.
Scottish Raptor Study Group	Annual publications detailing population and productivity estimates based on monitored populations for raptor species at the national and regional level.

Survey Work

8.4.7 A list of the field surveys carried out to inform the preparation of this Chapter is provided in **Table 8.5**. The detailed methodologies for, and results of, these surveys can be found in **Appendices 8B and 8C.** Following SNH guidance (SNH 2016d), **Confidential Appendix 8D** presents data and figures of flight activity, roosting locations and breeding locations associated with sensitive species from October 2017 - September 2018, and should be read in conjunction with **Appendices 8B, and 8C.**

8.4.8 **Table 8.5** lists the data recorded within the field survey area(s) as detailed in **Appendices 8B and 8C.**

Table 8.5 Summary of Ornithological Surveys

Survey	Relevant Guidance	Field Survey Area	Survey Period	Ref.
Vantage Point (VP) surveys	SNH (2017 V.2) Recommended bird survey methods to inform impact assessment of onshore wind farms.	Proposed Development and 500 m buffer	11/10/2017 – 25/09/2018	**Appendices 8B, 8C and 8D**.
Hen harrier Roost Monitoring	SNH (2017 V.2) Recommended bird survey methods to inform impact assessment of onshore wind farms; *Hardey et al (2009)*.	Specific roost location within Proposed Development	24/11/2017 – 20/03/2018	**Appendices 8B and 8D.**
Moorland Bird Survey	SNH (2017 V.2) Recommended bird survey methods to inform impact assessment of onshore wind farms.	Proposed Development and 500m buffer	16/04/2018 – 05/07/2018	**Appendices 8C** and **8D**.
Breeding raptor surveys	SNH (2017 V.2) Recommended bird survey methods to inform impact assessment of onshore wind farms.	Proposed Development and 2km buffer (6km for golden eagle and white-tailed eagle)	11/04/2018 – 18/07/2018	**Appendices 8C** and **8D**.

Survey	Relevant Guidance	Field Survey Area	Survey Period	Ref.
Breeding diver surveys	SNH (2017 V.2) Recommended bird survey methods to inform impact assessment of onshore wind farms.	Proposed Development and 1km buffer	21/05/2018 – 26/06/2018	**Appendices 8C** and **8D**.
Breeding hen harrier focal watches	SNH (2017 V.2) Recommended bird survey methods to inform impact assessment of onshore wind farms.	Specific nest locations within 2km buffer	17/04/2018 – 26/07/2018	**Appendices 8C** and **8D**.
Breeding diver focal watches	SNH (2017 V.2) Recommended bird survey methods to inform impact assessment of onshore wind farms.	Specific nest locations within 1km buffer	12/06/2018 – 22/08/2018	**Appendices 8C** and **8D**.

8.5 Overall Baseline

8.5.1 A summary of the ornithological baseline as determined through desk study and field survey is provided below. Further species specific baseline details are provided in **Sections 8.10 – 8.24**, and detailed descriptions are provided in **Appendices 8A, 8B, 8C and 8D**.

Current Baseline

Site Context and Surrounding Habitats

8.5.2 The Development Site is located south west of Stornoway and east of the Lewis Peatlands SAC, SPA and Ramsar on land owned by the Stornoway Trust. The terrain is characterised by low lying blanket bog and moorland, with fragmented coniferous plantation forest. The Development Site is intersected by three river catchments, from north to south the catchments are - the River Laxdale (Abhainn Lacasdail), Glen River (Abhainn a' Ghlinn Mhoir) and River Creed (Abhainn Ghrioda). The River Tope (Abhainn Leireabhaigh) is situated to the south of the Development Site. The River Creed is notably larger than the other watercourses. There are also a number of freshwater lochs within the Development Site.

8.5.3 Current land management practices comprise some sheep grazing and small-scale (crofter) peat cutting. In Arnish to the south of the Development Site, sheep numbers are higher and grazing here more intense. As a result, the vegetation here is much less lush and there are more frequent and extensive patches of bare peat with signs of trampling.

8.5.4 Bennadrove Landfill and Civic Amenity Site is located in the northern part of the Development Site and the operation Beinn Greidaig Wind Farm comprising three operational turbines is located within the Development Site (**See Figure 4.1**).

Statutory Nature Conservation Sites (International/European)

8.5.5 **Figure 8A.1.1** illustrates the locations of the statutory nature conservation sites designated under international conventions or via European directives within the Study Area. Sites designated primarily for ecology interest are discussed in **Chapter 9**, while those designated primarily for their ornithological interest are considered in this Chapter. These comprise:

- The Lewis Peatlands SPA, adjacent to and extends along the western and northern boundaries of the Development Site (100m from the closest turbine 24;
- The Lewis Peatlands Ramsar, adjacent to and extends along the western and northern boundaries of the Development Site (100m from the closest proposed infrastructure); and
- Ness and Barvas SPA, approximately 13.5km north of the closest proposed infrastructure (SNH confirmed that Ness and Barvas SPA was not functionally linked with the Proposed Development in their scoping response, and the qualifying feature, corncrake, was not recorded in the Study Area, nor does the Study Area contain any preferred corncrake breeding habitat.)

Statutory Nature Conservation Sites (National)

8.5.6 **Figure 8A.1.1** also illustrates the locations of the statutory nature conservation sites designated under national legislation within the Study Area that support ornithological qualifying features. These comprise:

- Tong Saltings SSSI (3km east of the closest proposed infrastructure); and
- Achmore Bog SSSI (3.8km south west of the closest proposed infrastructure).

Non-Statutory Nature Conservation Sites

8.5.7 No non-statutory nature conservation sites were recorded within the Study Area.

Species

8.5.8 **Table 8.6** provides a brief summary of all species recorded during bird surveys. A detailed summary of the species recorded across the Development Site is presented in **Appendices 8B, 8C** and **8D.** Corncrake, the qualifying feature for Ness and Barvas SPA was not recorded during any surveys therefore Ness and Barvas SPA was not considered further in this assessment.

8.5.9 **Table 8.6** indicates whether the bird is a qualifying feature of the Lewis and Peatlands SPA, is listed on Annex 1 of the Birds Directive, Schedule 1 of the Wildlife and Countryside Act (as amended) (W.C.A.) or is a species of principal importance on the Scottish Biodiversity list (SBL). The species status on the Birds of Conservation Concern List (BoCC) is displayed as green, amber or red (*Eaton et al. 2015*). Species have been arranged alphabetically as opposed to taxonomically for convenience.

Table 8.6 Summary of Ornithological Survey Results October 2017 – September 2018

Species	Status	No Territories in Proposed Development Site	Summary
Arctic skua	Scottish Biodiversity List (SBL) BoCC Red List	0	A single flight was recorded from Vantage Point (VP) surveys, and consisted of a single bird in June 2018.
Black-throated diver	Lewis Peatlands SPA / Ramsar W.C.A. Schedule 1[7] SBL BoCC Amber List	1	24 flights were recorded during VP surveys. Two breeding attempts were recorded within the field survey area, one of which appeared to fail at the egg laying stage whilst the second failed at the chick rearing stage. A third pair located outside of the field survey area possibly fledged two chicks. No breeding attempts were located within the part of the Lewis Peatlands SPA that the survey area covered, although the one which appeared to fail at the egg laying stage was immediately adjacent. An additional 9 flights were recorded from focal watch surveys of the pair within the field survey area that failed at the chick rearing stage.
Black-tailed godwit	W.C.A. Schedule 1 SBL BoCC Red List	0	A single flight was recorded during VP surveys, consisting of a flock of five birds in May 2018.
Barnacle goose	Annex 1 Birds Directive Scottish Biodiversity List (SBL) BoCC Amber List	0	A single flight was recorded during VP surveys, consisting of a flock of 15 birds in October 2017.
Common sandpiper	BoCC Amber List	1	An estimated 10 territories were recorded within the field survey area in 2018.
Common tern	Annex 1 Bird Directive SBL BoCC Amber List	c 50	86 flights were recorded during VP surveys. A colony of approximately 50 pairs were recorded within the field survey area, nesting within the Development Site on an island on Loch a Chlachain.
Dunlin	Lewis Peatlands SPA / Ramsar SBL BoCC Amber List	5	Six flights were recorded during VP surveys. An estimated seven territories were recorded within the field survey area in 2018.
Golden eagle	Lewis Peatlands SPA / Ramsar W.C.A Schedule 1,1A and A1 SBL BoCC Green List	0	86 flights were recorded during VP surveys. Three active breeding territories were recorded within the field survey area, two of which failed to breed in 2018. The breeding status of the third pair in 2018 is unknown.
Golden plover	Lewis Peatlands SPA / Ramsar SBL BoCC Green List	4	40 flights were recorded during VP surveys. An estimated 10 territories were recorded within the field survey area in 2018.

[7] Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) makes it an offence to recklessly or intentionally disturb any Schedule 1 species while they are nest building, or at a nest containing eggs or young, or to disturb the dependant young of such birds. Further protection is given to birds listed on Schedule 1A (it is an offence **at any time** to harass a white-tailed eagle, golden eagle, hen harrier or red kite) and Schedule A1 (it is an offence to damage a nest of a white-tailed eagle or golden eagle)

Species	Status	No Territories in Proposed Development Site	Summary
Great black-backed gull	BoCC Amber List	32	An estimated 32 AON (Apparently Occupied Nests) were recorded within the field survey area in 2018.
Great skua	BoCC Amber List	8	280 flights were recorded during VP surveys. An estimated 9 AOT (Apparently Occupied Territories) were recorded within the field survey area in 2018.
Greenshank	Lewis Peatlands SPA / Ramsar W.C.A. Schedule 1 BoCC Amber List	0-2	17 flights were recorded during VP surveys. An estimated three to six territories were recorded within the field survey area in 2018.
Greylag goose	BoCC Amber List	5	96 flights were recorded during VP surveys. An estimated 10 territories were recorded within the field survey area in 2018.
Hen harrier	Annex 1 Birds Directive Schedule 1, 1A BoCC Red List SBL	3	186 flights were recorded during VP surveys. Five active territories were recorded within the field survey area in 2018, three of which successfully fledged young. Focal watch surveys recorded a total of 189 flights whilst monitoring the nest locations.
Herring gull	SBL BoCC Red List	c. 170	Six colonies, totalling an estimated 210 AON, were recorded within the field survey area in 2018.
Lesser black-backed gull	BoCC Amber List	61	An estimated 63 AON were recorded within the field survey area in 2018.
Mallard	BoCC Amber List	1	A single breeding attempt was recorded within the field survey area.
Merlin	Lewis Peatlands SPA W.C.A. Schedule 1 SBL BoCC Red List	0	29 flights were recorded during VP surveys. A single active territory was recorded within the field survey area in 2018.
Peregrine	Annex 1 Birds Directive W.C.A. Schedule 1 SBL BoCC Green List	0	Two flights were recorded during VP surveys. No territories were recorded within the field survey area in 2018.
Red-throated diver	Lewis Peatlands SPA / Ramsar W.C.A. Schedule 1 SBL BoCC Green List	1	125 flights were recorded during VP surveys. Four breeding attempts were recorded within the field survey area in 2018, three of which were within the Lewis Peatlands SPA. An additional breeding attempt, also within the SPA, was located approximately 2.3km from the Development Site. All breeding attempts appeared to be successful. Focal watch surveys recorded a total of 165 flights whilst monitoring the nest locations.
Short-eared owl	Annex 1 Birds Directive BoCC Amber List	1 possible	Six flights were recorded during VP surveys. No territories were recorded within the field survey area in 2018.

Species	Status	No Territories in Proposed Development Site	Summary
Snipe	BoCC Amber List	7	An estimated seven territories were recorded within the field survey area in 2018.
Teal	BoCC Amber List	0	Two flights were recorded during VP surveys.
White-tailed eagle	Annex 1 Birds Directive W.C.A. Schedule 1, 1A and A1, SBL, BoCC Red List	0	44 flights were recorded during VP surveys. A single breeding territory falls within the field survey area, although the breeding attempt failed in 2018.
Whooper swan	Annex 1 Birds Directive W.C.A. Schedule 1 SBL BoCC Amber List	1	A single flight was recorded during VP surveys.

AON = apparently occupied nest / AOT = apparently occupied territory

Future Baseline

8.5.10 Determining a future baseline draws upon information about the likely future use and management of the Development Site in the absence of the Proposed Development, known population trends (for species), climate change and any other proposed developments (consented or otherwise) that may act cumulatively with the Proposed Development to affect ornithological features.

8.5.11 Land use/management is currently anticipated to remain largely unchanged in the absence of the Proposed Development.

8.5.12 One factor which may play a significant role in population trends for ground nesting birds has been the successful eradication of non-native American mink through the implementation of the Hebridean Mink Project. Mink arrived on the Western Isles in the 1950s when fur farms became established. Escapes and illegal releases led to a rapid colonisation, with feral animals recorded on Lewis by 1969. The spread of the American mink and its presence across the Outer Hebrides threatened many ground nesting bird populations due to predation. SNH established the Hebridean Mink Project in 2001 to prevent further significant losses to ground nesting birds and migratory species found in SPAs. Mink numbers are now at very low levels, with only seven animals caught in Lewis and Harris in 2016. Of these animals, one was a non-breeding female, and no juveniles have been caught since 2015. The number and distribution of tern colonies across the project area continues to increase, with many more small colonies successfully breeding. Anecdotal evidence suggests that many other bird species such divers, waders and ducks have also increased in number.

8.5.13 Climate change may lead to wetter and windier weather during the breeding season period, and this may affect productivity through failed clutches on ground nesting birds.

8.5.14 The influence of other developments on bird species will be addressed through the cumulative assessment at **Section 8.26.**

8.5.15 Overall, although it is likely that the general bird assemblage would remain relatively constant compared to the current baseline situation, there are a number of factors that would act over the short and long-term to modify distribution and abundance of species. However, in the absence of empirical data on long-term population trends, it is considered that the current baseline is equally

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likely, or even more likely, to persist over the anticipated lifespan of the Proposed Development rather than there being a fundamental change. It is therefore considered appropriate to use the current baseline for the purpose of this assessment.

8.6 Consultation

8.6.1 **Table 8.7** provides a summary of consultee comments about the Proposed Development and the responses given.

Table 8.7 Summary of Consultee Comments Regarding Biodiversity

Consultee	Comments	Response and How Considered in this Chapter	Section Ref
SNH	In view of the proximity of the Lewis Peatlands SPA and potential usage of the site by the qualifying species of the SPA, we recommend two years' worth of field data should be gathered to inform impacts upon the site, in accordance with our guidance. Between the 2011 application and current proposal, the only known population of hen harrier in Lewis and Harris has become established within the development site. This represents an important material change in conditions on the site. The latest information on the 2018 breeding season makes clear that the northern part of the development site is not necessarily the most sensitive with respect to hen harriers, with nesting attempts being recorded across the whole area. This reinforces the importance of having adequate and up to data information upon which to base assessment of impacts, and to inform the development of the layout. For this reason too, we recommend that two years of data gives the best chance of capturing a dataset robust enough to make a sound impact assessment. Alternatively, the developer would need to justify how a shorter survey period could provide a sufficiently robust basis upon which to inform impact assessment for these highly sensitive receptors, especially the SPA species and the recently established hen harrier breeding population. We advise that impacts upon the North Harris Mountains SPA and Loch Laxvat SSSI can be scoped out due to lack of connectivity with the development proposal. We agree with the list of the most likely occurring species of conservation concern. We agree with the approach to Habitats Regulations Appraisal, subject to the advice above about North Harris Mountains SPA. The ornithology chapter hasn't included plans for post-construction monitoring or carcass searches – it would be appropriate to propose a suitable programme to cover both of these areas post-construction.	The results of a desk study and field surveys from October 2017 – September 2018 have been used to determine the baseline context of this EIA. In addition to this, survey activity surveys were conducted in 2010/11 as part of the Stornoway Wind Farm 2012 application and surveys were carried out over 2015 - 2016 in the north-western area of the Development Site. The findings of surveys have identified that the baseline has remained the same or similar for all species other than hen harrier and red throated diver. In terms of Hen harrier, they have colonised the Development Site since 2015, having no record of them before that time. Hen harriers are known to move around, from year to year. Designing a wind farm based on known nest, roosting and foraging territory would not necessarily benefit the species. Instead, mitigation through the retention of a much stunted woodland on site has been retained to allow further habitat for the birds. In terms of red throated diver, they have been present on the Development Site since before 2011. However their numbers have substantively increased since the grant of the Consented Development. Because of this, the design of the wind farm has incorporated corridors to allow gaps in the turbine locations for red throated divers to travel from the SPA, the site, and out to the coast. Field data collected during this period (pertinent to this assessment) included breeding and non-breeding bird surveys.	**Appendix 8A, 8B, 8C** and **8D** **Appendix 8E** **Appendix 8H** **Section 8.29**

Consultee	Comments	Response and How Considered in this Chapter	Section Ref
		These features were scoped out of the assessment process. A HRA has been carried out (**Appendix 8H**). The monitoring of operational effects on ornithology is identified in **Table 8.25** via an Ornithological Monitoring Plan as a Planning condition	
Comhairle nan Eilean Siar	All survey work requested by SNH should be carried out by the developer, to ensure it is up to date and robust for the EIA Report. SNH and RSPB should be closely consulted on all aspects of the assessment with regard to impacts on ornithology. It is noted that the site includes a number of wooded areas and subject to SNH advice it may be advisable to subject these areas to a minimum of fresh walk over surveys to rule out new nest sites.	SNH, RSPB and the Lewis and Harris Raptor Study Group were kept informed of all significant survey findings, and support was provided to the LHRSG during ringing operations of hen harrier chicks. All wooded areas within the field survey area were surveyed using appropriate methodology during the 2017-2018 non-breeding and 2018 breeding survev seasons (see **Table 8.5**).	**Appendix 8B, 8C** and **8D**
RSPB	SNH guidance states that extensions or revisions of previous proposals should be treated in exactly the same way as new proposals with regard to assessing the impact on birds and that data used to inform EIA should have been collected within the last 5 years. The same guidance also recommends that a minimum of two years of survey work should be carried out, particularly in sensitive bird areas and where there is a risk that developments could have an impact on designated sites. Several of the species of conservation concern listed as being present on the site in paragraph 7.3.14 of the scoping report are known to use alternative nest sites between years that can be several kilometres apart and therefore the usage of a given area can vary significantly between years. Taking into account the number of species of conservation concern using the site, known changes in usage since 2010, the size of the site, its proximity to the Lewis Peatlands Special Protection Area (SPA) and the age of the existing data, we strongly consider that two full years of survey work across the whole site should be required.	The results of a desk study and field surveys from October 2017 – September 2018 have been used to determine the baseline context of this area. In addition to this recent activity surveys conducted in 2010/11 as part of the Stornoway Wind Farm 2012 application and surveys carried out over 2015 - 2016 in the north-western area of the site. Field data collected during this period (pertinent to this assessment) included breeding and non-breeding bird surveys. Focal watch surveys commenced in April 2018, and covered the full breeding season through May, June and July, by which time all chicks had fledged.	

Consultee	Comments	Response and How Considered in this Chapter	Section Ref
	With the exception of the duration of the surveys proposed, the survey methods described in the Scoping Report appear to be appropriate and sufficient in order to assess impacts on ornithology. However, it is particularly important to ensure focal watches are undertaken at hen harrier breeding areas during the early breeding season period (April and May), when they are prospecting and engaging in display flight at height. It is during this period when they are likely to be most susceptible to collisions and when all Scottish hen harrier collisions to date have been recorded.		**Appendix 8C** and **8D**
	The EIA report should also consider and detail mitigation measures (such as exclusion or re-siting of proposed turbines, habitat restoration and creation of compensatory or offsetting habitat) to avoid or minimise impacts on birds. For hen harrier, eagle species and diver species, two years of data are likely to show patterns in activity around breeding sites, foraging areas and roost sites and these findings should be used to inform the locations and number of turbines and identification of mitigation to minimise impacts. For hen harriers, turbine shut-down for periods in areas where birds are particularly susceptible to collisions early in the breeding season (April – May) should also be considered to minimise collision risk. Buffers around nest sites, free of turbines and other infrastructure, should also be considered and proposed in order to prevent displacement of birds. *Whitfield et al* advise a disturbance free buffer of 500-750m around hen harrier nest sites. Several proposed turbine locations shown in Figure 2.2 of the Scoping Report are within a few hundred meters of hen harrier nest sites.	As part of an overarching Construction Environmental Management Plan (CEMP), a Bird Protection Plan would be developed and agreed, in consultation with the Project Ecologist and the relevant consultees, in advance of construction works commencing. Method Statements (MSs) would be developed to detail the mitigation approach for all bird receptors. These would cover the site and receptor specific requirements of the embedded mitigation as outlined in **Table 8.9**. The monitoring of operational effects on ornithology is identified in **Table 8.23** via an Ornithological Monitoring Plan as a Planning condition.	**Section 8.8** and **Section 8.27** **Section 8.29**
	The SNH 2014 guidance recommends (in paragraph 3.6) that for wind farms over 50MW, a comparable control or reference site should be selected and surveyed at the time of the initial surveys, to allow post construction monitoring.	Whilst SNH (2017) does recommend this, it also acknowledges that on a practical level it can be difficult to find suitable sites. Given restrictions of land ownership, a control site was not included in field surveys from October 2017 – September 2018.	
	We advise that the cumulative impact assessment must take full account of the new SNH (2018) guidance on "Assessing the cumulative impacts of onshore wind farm developments on birds." The cumulative impact assessment should consider displacement and barrier effects as well as collision risk, in line with the SNH guidance.	Cumulative assessment has been undertaken in line with SNH (2018) guidance.	**Section 8.26**

8.7 Scope of the Assessment

8.7.1 With the exception of **Chapter 9** the method for determining the scope of the assessment within this Chapter differs from that used in other technical Chapters within this EIA Report to correspond with topic specific guidance (i.e. CIEEM 2018). However, the relevant receptors (i.e. ornithological features in this case) and the spatial and the temporal scope are all defined in this section. The method has multiple stages enabling the scope of the assessment to be progressively refined.

Ornithological Features

Scoping - Determining Importance

8.7.2 The first stage in determining the scope of this assessment is to identify which ornithological features identified through the desk study and field surveys (see **Section 8.5**) are 'important'[8] in the context of the Proposed Development. Following CIEEM (2018) guidance, the importance of ornithological features is first determined with reference to UK legislation and policy and then with regard to the extent of habitat or size of population that may be affected by the Proposed Development.

8.7.3 As the importance of ornithological features is determined with regard to the extent of habitat or size of population that may be affected by the Proposed Development, each status can differ from that which would be conferred by legislative protection or identification as a conservation notable species. For example, skylark is important at a national level because it is a SBL species and features on the Birds of Conservation Concern red list. However, a small population that could be affected by a development would be assessed as being of less than national importance due to the large, albeit declining, UK wide population (of around 1.5 million pairs).

8.7.4 Wherever possible, information regarding the extent and population size, population trends and distribution of the ornithological features has been used, to inform the categorisation described in **Table 8.8** to determine importance at the project level. Where detailed criteria or contextual data are not available, professional judgement was used to determine importance.

8.7.5 An explanation of all determinations of importance of scoped in ornithological features is provided in this section and **Table 8.9** (this is the same table as presented in **Chapter 9**, and therefore includes features such as some designated sites that may not necessarily support ornithological features). **Appendix 8E** (Tables 8E.1 and 8E.2) provides a summary of assessed importance for all ornithological features, i.e. those scoped in and out, to ensure transparency.

[8] Importance relates to the quality and extent of designated sites and habitats, habitat/species rarity and their rate of decline. Ornithological features that are not considered to be important are those that are sufficiently widespread, unthreatened and resilient and with populations that will remain viable and sustainable irrespective of the Proposed Development.

Table 8.8 Importance of Ornithological Features

Geographic Context of Importance	Example / Description
International or European	1. European sites including SPAs, SACs, candidate SACs and Sites of Community Importance (SCI), potential SPAs (pSPA) possible SACs (pSACs) should also be considered in the same manner in accordance with National Planning Policy. 2. Areas of habitat or populations of species[9] which meet the published selection criteria based on discussions with SNH and field data collected to inform the EcIA for designation as a European site or Ramsar site, but which are not themselves currently designated at this level.
National	1. A nationally designated site including SSSIs and National Nature Reserves (NNRs). 2. Areas (and the populations of species which inhabit them) which meet the published selection criteria guidelines for selection of biological SSSIs but which are not themselves designated based on field data collected, and in agreement with SNH. 3. Scottish Biodiversity List (SBL) habitats and species, Red listed and legally protected species that are not addressed directly in Part 2 of the "Guidelines for Selection of Biological SSSIs" but can be determined to be of national importance using the principles described in Part 1 of the guidance.
Regional	1. Regionally occurring populations of SBL species will be considered to be of regional importance in the context of published information on population size and distribution.
County	1. LNRs and Non-statutory designated sites. 2. Areas which based on field data collected to inform the EcIA meet the published selection criteria for those sites listed above (for habitats or species, including those listed in relevant Local Biodiversity Action Plans) but which are not themselves designated.
Local	1. SBL habitats and species, Red listed and legally protected species that based on their extent, population size, quality etc are determined to be at a lesser level of importance than the geographic contexts above. 2. Common and widespread native species occurring within the Study Area in numbers greater than may be expected in the local context.
Negligible	1. Common and widespread species that do not occur in levels elevated above those of the surrounding area.

8.7.6 All ornithological features that were determined to be of negligible importance have been scoped out of the assessment at this stage. Further, ornithological features of local importance, were also scoped out at this stage, where there was a specific technical justification to do so. This is because effects on them would not influence the decision-making about whether or not consent should be granted for the Proposed Development (in other words a significant effect in EIA terms could not occur). This approach is consistent with that described in CIEEM 2018. Specific justification for exclusion of each of these ecological features is provided in **Appendix 8E** (Tables 8E.1 and 8E.2).

8.7.7 All ornithological features that are of sufficient importance were then taken through to the next stage of the scoping assessment.

Spatial Scope

8.7.8 The construction and operation and decommissioning phases of the Proposed Development may result in a number of direct and indirect environmental changes that could significantly affect ornithological features/receptors:

- Construction and decommissioning disturbance: Activities including use of plant and the presence of workforce resulting in an increase in aural and visual stimuli due to noise and

[9] This includes habitats and species listed under Annex I and Annex II of the Habitats Directive.

vibration, and movement of construction vehicles resulting in disturbance or temporary displacement of breeding and foraging birds (potential effects are likely to be greatest during the breeding season (mainly between March and August, depending on species) and behavioural sensitivity to the effects will vary between species);

- Operational disturbance: The operation of turbines and associated human activities for maintenance purposes also has the potential to cause disturbance and displace birds from the Proposed Development, although it is recognised that disturbance effects during the operational phase will be less than during the construction phase (*Pearce-Higgins et al 2012*);
- Operational displacement leading to barrier effects: individual turbines, or the wind farm as a whole, may present a barrier to the movement of birds, restricting or displacing birds from much larger areas. The effect this would have on a population is subtle and difficult to predict with any great certainty. If birds regularly have to fly over or around obstacles or are forced into suboptimal habitats, this may result in reduced feeding efficiency and greater energy expenditure. By implication, this will reduce the efficiency with which they accumulate energy reserves, potentially affecting breeding success; and
- Collision risk: Collision with a turbine rotor is almost certain to result in the death of the bird. It should be noted that operational disturbance and collision risk effects are mutually exclusive in a spatial sense: i.e. a bird that avoids the wind farm area due to disturbance cannot be at risk of collision with the turbine rotors at the same time. However, they may not be mutually exclusive in a temporal sense; should a bird may initially avoid the wind farm, but later habituate to it and return, it would then be at risk of collision;
- Changes to the surface hydrology that could lead to detrimental changes in wetland flora and fauna as a result of increased drainage and/or dewatering;
- Increased pollution risk associated with accidental spillage of fuels, oils, run-off and dust emission i.e. via direct contact, air or water, leading to harm or degradation to species and habitats.

8.7.9 Key to establishing which environmental changes may result in likely significant effects, is the determination of a ZoI for each important ornithological feature identified. ZoIs differ depending on the type of environmental change (i.e. the change from the existing baseline) as a result of the Proposed Development and the ornithological feature being considered.

8.7.10 The most straightforward ZoI to define is the area affected by land-take and direct land-cover changes associated with the Proposed Development. This ZoI is the same for all affected features.

8.7.11 By contrast, for each environmental change that can extend beyond the area affected by land-take and land-cover change (e.g. increased noise associated with construction activities within the land-take area), the ZoI may vary between ecological features, dependent upon their sensitivity to the change and the precise nature of the change. For example, a water vole might only be disturbed by noise generated close to its burrow, while nesting hen harrier might be disturbed by noise generated at a much greater distance, and other species (e.g. many invertebrates) may be unaffected by changes in noise. In view of these complexities, the definition of the ZoI that extends beyond the land-take area was based upon professional judgement informed (as far as possible) by a review of published evidence (e.g. disturbance criteria for various species) and discussions with the technical specialists who are working on other Chapters of the EIA Report.

8.7.12 It should be noted that the avoidance of potentially significant effects through the design process are implicitly taken into account through the consideration of each ZoI, as are standard construction practices that are common place. When scoping in or out ornithological features from further assessment, environmental measures (see **Section 8.8**) associated with general good practice that are described within the Code of Practice for planning and development (BSI, 2013) and Good Practice during Wind Farm Construction (*Scottish Renewables et al., 2015*) have been taken in to account (e.g. dust suppression, appropriately scheduled vegetation removal etc.) and referenced in **Appendix 8E**.

8.7.13 Ornithological features that are scoped into the assessment (i.e. those of sufficient importance occurring within a relevant ZoI) are summarised in **Table 8.9**, along with a summary of the justification for inclusion. All ornithological features that were determined to be of negligible importance have been scoped out of the assessment (See **Section 8.8.6**) **Table 8.9** notes both the level of importance of an ornithological feature in the context of legislation and policy and the level of importance of the feature in the context of the Development Site. The rationale for this is that while red-throated diver for example may be considered to be of international importance if it is a designated feature of a nearby SPA, the importance assigned to it as an ornithological feature within the context of a Development Site if this species was only recorded once in flight over it would be reduced.

8.7.14 For each ornithological feature presented in **Table 8.9**, the potential environmental changes and potential significant effects resulting from the Proposed Development are provided.

Table 8.9 Likely Effects, ZoIs and Justification for Scoped in Ornithological Features

Ornithological Feature	Importance – Legislation and Policy	Importance – Development Site	Environmental Changes and Likely Significant Effects	Zone of Influence	Relevant Assessment Criteria and Scoped in Justification
Lewis Peatlands SPA / Ramsar: black-throated diver	International	International	Operational displacement leading to barrier effects.	Within 750m of the Proposed Development footprint (based on guidance in SNH 2017).	Breeding black-throated diver normally forage within large fresh-water lochs, and do not make regular commuting flights to and from the sea. However, flight activity recorded during surveys (**Appendix 8D** and **8F**) indicates that the Proposed Development may cause a barrier effect between breeding locations and feeding lochs
Lewis Peatlands SPA: golden eagle	International	International	Potential collision with operational turbines.	Within 500m of the Proposed Development boundary (based on guidance in SNH 2017).	Flight activity (**Appendix 8D and 8F**) indicates that there is potential for significant effects to the SPA population.
Lewis Peatlands SPA / Ramsar: greenshank	International	International	Construction activity including use of plant and the presence of workforce resulting in an increase in aural and visual stimuli due to noise and vibration, and movement of construction vehicles resulting in temporary disturbance or displacement.	Within 500m of Proposed Development footprint (based on disturbance distances as described by Ruddock & Whitfield 2007).	Locations of breeding birds potentially associated with the SPA qualifying population fall within disturbance distance of proposed works.
Lewis Peatlands SPA / Ramsar: red-throated diver	International	International	Construction activity including use of plant and the presence of workforce resulting in an increase in aural and visual stimuli due to noise and vibration, and movement of construction vehicles resulting in temporary disturbance or displacement.	Within 750m of Proposed Development footprint (based on disturbance distances as described by Ruddock & Whitfield 2007).	Locations of breeding birds potentially associated with the SPA qualifying population fall within disturbance distance of proposed works.

Ornithological Feature	Importance – Legislation and Policy	Importance – Development Site	Environmental Changes and Likely Significant Effects	Zone of Influence	Relevant Assessment Criteria and Scoped in Justification
			Operational displacement leading to barrier effects.	Within 500m of the Proposed Development boundary (based on guidance in SNH 2017).	Breeding red-throated diver normally forage at sea, making regular commuting flights to and from breeding lochs inland. Flight activity recorded during surveys indicates that the Proposed Development may potentially cause a barrier effect to breeding red-throated diver.
			Potential collision with operational turbines.	Within 500m of the Proposed Development boundary (based on guidance in SNH 2017).	Flight activity (**Appendix 8F**) indicates that there is potential for significant effects to occur on the SPA population.
Black-throated diver: breeding	International	Regional	Construction activity including use of plant and the presence of workforce resulting in an increase in aural and visual stimuli due to noise and vibration, and movement of construction vehicles resulting in disturbance or displacement.	Within 750m of Proposed Development footprint (based on disturbance distances as described by Ruddock & Whitfield 2007).	Locations of breeding birds fall within disturbance distance of proposed works.
			Operational displacement leading to barrier effects.	Within 500m of the Proposed Development boundary (based on guidance in SNH 2017).	Breeding black-throated diver normally forage within large fresh-water lochs, and do not make regular commuting flights to and from the sea. However, flight activity recorded during surveys (**Appendix 8D** and **8F**) indicates that the Proposed Development may cause a barrier effect between breeding locations and feeding lochs.
Common tern: breeding	International	Regional	Operational displacement leading to barrier effects.	Within 500m of the Proposed Development boundary (based on guidance in SNH 2017).	Flight activity recorded during surveys (**Appendix 8C** and **8F**) indicates that the Proposed Development may potentially cause a barrier effect to breeding common tern.
			Potential collision with operational turbines.	Within 500m of the Proposed Development boundary (based on guidance in SNH 2017).	Flight activity (**Appendix 8F**) indicates that there is potential for significant effects to occur on the regional population.

Ornithological Feature	Importance – Legislation and Policy	Importance – Development Site	Environmental Changes and Likely Significant Effects	Zone of Influence	Relevant Assessment Criteria and Scoped in Justification
Hen harrier: breeding	International	Regional	Construction activity including use of plant and the presence of workforce resulting in an increase in aural and visual stimuli due to noise and vibration, and movement of construction vehicles resulting in disturbance or displacement of breeding birds.	Within 750m of Proposed Development footprint (based on disturbance distances as described by Ruddock & Whitfield 2007).	Locations of breeding birds fall within disturbance distance of proposed works.
			Potential disturbance and displacement to birds due to the operation of turbines and associated human activities for maintenance purposes.	Within 750m of Proposed Development footprint.	Although effects during the operational phase will be less than that experienced during the construction phase, hen harrier may still be disturbed during this phase.
			Operational displacement leading to barrier effects.	Within 500m of the Proposed Development boundary.	Flight activity recorded during surveys (**Appendix 8D** and **8F**) indicates that the Proposed Development may cause a barrier effect.
			Potential collision with operational turbines.	Within 500m of the Proposed Development boundary (based on guidance in SNH 2017).	Flight activity (**Appendix 8F**) indicates that there is potential for significant effects to occur on the regional population.
Hen harrier: non-breeding	International	Regional	Construction activity including use of plant and the presence of workforce resulting in an increase in aural and visual stimuli due to noise and vibration, and movement of construction vehicles resulting in disturbance or displacement.	Within 750m of Proposed Development footprint (based on disturbance distances as described by Ruddock & Whitfield 2007).	Locations of non-breeding birds fall within disturbance distance of proposed works.
			Potential disturbance and displacement to birds due to the operation of turbines and associated human activities for maintenance purposes.	Within 500m of Proposed Development footprint.	Although effects during the operational phase will be less than that experienced during the construction phase hen harrier may still be disturbed during this operational phase.

Ornithological Feature	Importance – Legislation and Policy	Importance – Development Site	Environmental Changes and Likely Significant Effects	Zone of Influence	Relevant Assessment Criteria and Scoped in Justification
			Operational displacement leading to barrier effects.	Within 500m of the Proposed Development boundary.	Flight activity recorded during surveys (**Appendix 8D** and **8F**) indicates that the Proposed Development may cause a barrier effect.
Red-throated diver: breeding	International	Regional	Construction activity including use of plant and the presence of workforce resulting in an increase in aural and visual stimuli due to noise and vibration, and movement of construction vehicles resulting in disturbance or displacement of breeding birds.	Within 750m of Proposed Development footprint (based on disturbance distances as described by Ruddock & Whitfield 2007).	Locations of breeding birds fall within disturbance distance of proposed works.
			Potential disturbance and displacement to birds due to the operation of turbines and associated human activities for maintenance purposes.	Within 750m of Proposed Development footprint.	Although disturbance effects during the operational phase will be less than that experienced during the construction phase Red-throated diver may still be disturbed during this operational phase.
			Operational displacement leading to barrier effects.	Within 500m of the Proposed Development boundary (based on guidance in SNH 2017).	Breeding red-throated diver normally forage at sea, making regular commuting flights to and from breeding lochs inland. Flight activity recorded during surveys indicates that the Proposed Development may potentially cause a barrier effect to breeding red-throated diver (**Appendix 8D)**.
White-tailed eagle: breeding	International	Regional	Potential collision with operational turbines.	Within 500m of the Proposed Development boundary (based on guidance in SNH 2017).	Flight activity (**Appendix 8D and 8F**) indicates that there is potential for significant effects to the Natural Heritage Zone (NHZ population.
White-tailed eagle: non-breeding	International	Regional	Potential collision with operational turbines.	Within 500m of the Proposed Development boundary (based on guidance in SNH 2017).	Flight activity (**Appendix 8D and 8F**) indicates that there is potential for significant effects to the NHZ population.

Ornithological Feature	Importance – Legislation and Policy	Importance – Development Site	Environmental Changes and Likely Significant Effects	Zone of Influence	Relevant Assessment Criteria and Scoped in Justification
Whooper swan: breeding	International	National	Construction activity including use of plant and the presence of workforce resulting in an increase in aural and visual stimuli due to noise and vibration, and movement of construction vehicles resulting in disturbance or displacement of breeding birds.	Within 500m of Proposed Development footprint (based on disturbance distances as described by Ruddock & Whitfield 2007).	Locations of breeding birds fall within disturbance distance of proposed works.
			Potential disturbance and displacement to birds due to the operation of turbines and associated human activities for maintenance purposes.	Within 500m of Proposed Development footprint.	Although effects during the operational phase will be less than that experienced during the construction phase, disturbance may still occur.

Temporal Scope

8.7.15 The temporal scope of this assessment is consistent with the period over which the Proposed Development would be carried out and therefore covers a.) construction; b.) operation; and c.) decommissioning periods (as outlined in **Chapter 4**).

a. Construction of the Proposed Development would be completed over a period of up to 30 months. Working hours are likely to vary through the year, depending on day length, but would typically be 7am-7pm Monday to Friday and 7-1pm on Saturdays;

b. Operation of the Proposed Development is anticipated to be 25 years; and

c. Decommissioning is anticipated to take less than 6 months - wind turbines (towers, nacelle, hub, blades and electrical kiosk) and substations can be dismantled using a crane and removed from site, whilst access tracks and below ground infrastructure (<1m) would remain in situ.

8.7.16 The effects of the environmental changes are considered with respect to their duration, frequency, timing and reversibility for each of the scoped in ornithological features in **Table 8.9**.

8.8 Environmental Measures Embedded into the Development Proposals

8.8.1 A range of environmental measures have been embedded into the Proposed Development as outlined in **Chapter 3: Scheme need, alternatives and iterative design process**. **Table 8.10** outlines how these embedded measures influence this ornithological impact assessment.

Table 8.10 Summary of the Embedded Environmental Measures and how these Influence the Assessment

Ornithological Feature	Changes and Effects	Embedded measures and influence on assessment
CONSTRUCTION PHASE:		
Breeding and roosting bird species	Construction and decommissioning disturbance	The following measures would be incorporated into the Proposed Development in order to minimise construction effects to breeding or roosting bird species: 1. As part of an overarching Construction Environmental Management Plan (CEMP), a Bird Protection Plan (BPP) would be developed in consultation with the relevant consultees in advance of construction works commencing. Construction Method Statements (CMSs) would be developed to detail the mitigation approach for all bird receptors. These would cover the site and receptor specific requirements of the embedded mitigation as outlined in the remainder of this table; 2. Site supervision would be provided by a suitably experienced Environmental Clerk of Works (ECoW), who would be responsible for ensuring the successful implementation of embedded measures, including pollution prevention, monitoring of buffers around construction areas and reference to areas of high ecological sensitivity, and adherence to current construction best practice; 3. Pre-construction verification check surveys would be undertaken for all protected bird species where potential significant effects or legal breaches could occur otherwise. 4. Maintain species specific buffers detailed in the BPP from nests during the breeding or roosting season until young fledge or method statements would be developed outlining the methods to allow works to continue within buffer areas where appropriate.

Ornithological Feature	Changes and Effects	Embedded measures and influence on assessment
		For example, in some cases, there may be a requirement to install suitable screening around working areas to allow it to continue within a buffer area. An ornithologist may be required to monitor the nesting birds during the working phase in certain areas and halt any significantly disturbing activities in consultation with the ECoW; 5. An emergency procedure would be implemented by site workers if a nest of a breeding bird is encountered. The ECoW would inspect the site and define appropriate measures (if required); 6. When construction activities are taking place at more than one location at any one time, this would be subject to ECoW approval, to avoid any cumulative impact on breeding bird activity; 7. A Habitat Management Plan (HMP) (**Appendix 9I**) would also be implemented with the aim of ensuring continued growth of the hen harrier population within and outside of the Development Site. A key objective would be to minimise the extent of tree removal from within the Development Site during the construction works (embedded mitigation), and then manage the remaining trees on site during operation. The HMP would be developed in consultation with SNH, and require to be approved by the planning authority, prior to the start of construction.
	Operational disturbance	Mitigation would be expected to be of a similar nature to construction where impacts and thus effects occur, but proportionally reduced in scale.
	Changes to surface hydrology	A construction area stand-off of at least 50m has been applied to all watercourses and water bodies (except for watercourse crossings). All watercourse crossings would be designed in accordance with the SEPA Good Practice Guide for the Construction of River Crossings (2010)) and, where culverts are required, have been designed in accordance with the CIRIA Culvert Design and Operation Guide (2010).
	Pollution incidents	A Pollution Prevention Plan (PPP) and Pollution Incident Response Plan (PIRP) would be prepared and subject to consultation with SEPA and SNH in advance of any construction activities and implemented as part of the overall CEMP. This would set out site management and working practices and draw heavily upon SEPA's Pollution Prevention and Control Guidelines (PPGs).

8.9 Assessment Methodology

Introduction

8.9.1 The generic project-wide approach to the assessment methodology is set out in **Chapter 4**, and specifically in **Section 4.2**. However, whilst this has informed the approach that has been used in this assessment, it is necessary to align the ornithology assessments with the standard industry guidance provided by CIEEM (2018).

8.9.2 The assessment has been based upon not only the results of the desk study and field surveys but also relevant published information (for example on the status, distribution, sensitivity to environmental changes and ecology of the ornithological features scoped in to the assessment, where this information is available), and professional knowledge of ecological processes and functions.

8.9.3 For each scoped-in ornithological feature (see **Table 8.9**), effects were assessed against the current baseline conditions for that feature during construction, operation and decommissioning.

8.9.4 The initial results of the assessment regarding potentially significant effects were used to inform whether additional baseline data collection was required, together with the identification of environmental measures that should be embedded into the Proposed Development to avoid or reduce adverse effects or to deliver enhancements (see **Section 8.8**). This was an iterative process with the results of desk study and surveys informing the requirement for additional scope of works/embedded mitigation. The results of the assessment, as set out in **Section 8.10** to **8.24**, therefore reflect the final scheme design (i.e. incorporating the environmental measures described in **Section 8.8** and **Table 8.10**).

8.9.5 The spatial extent of the assessment (see **Table 8.9**) reflects the area occupied by the ornithological feature being assessed and, as a minimum, the ZoI of the changes that are likely to affect it.

8.9.6 Where part of a designated site is located within the ecological ZoI relating to a particular biophysical change as a result of the Proposed Development, an assessment has been made of the effects on the designated site as a whole.

8.9.7 For species that occur within the ZoI, the assessment has considered the total area that is used by the affected individuals or the local population of the species (e.g. for foraging or as breeding territories).

Significance Evaluation Methodology

Overview

8.9.8 CIEEM (2018) defines a significant effect as one "*that either supports or undermines biodiversity conservation objectives for 'important ecological features' or for biodiversity in general*".

8.9.9 When considering potentially significant effects on ornithological features, whether these be adverse or beneficial, the following characteristics of environmental change are taken into account[10]:

- Extent – the spatial or geographical area over which the environmental change may occur;
- Magnitude – the size, amount, intensity or volume of the environmental change;
- Duration – the length of time over which the environmental change may occur;
- Frequency – the number of times the environmental change may occur;
- Timing – the periods of the day/year etc. during which an environmental change may occur;
- Reversibility – whether the environmental change can be reversed through restoration actions.

Magnitude of Change

8.9.10 Although the characteristics described above are all important in assessing effects by using information about the way in which habitats and species are likely to be affected, a scale for the magnitude of the environmental change as a result of the Proposed Development has been described in **Table 8.11** to provide an understanding of the relative change from the baseline position, be that an adverse or beneficial change.

[10] The definitions of the characteristics of environmental change are based on the descriptions provided in CIEEM 2018. Other Chapters in this EIA Report may use some of the same terms albeit with a different definition.

Table 8.11 Guidelines for the Assessment of the Scale of Magnitude

Scale of Change	Criteria and Resultant Effect
High	The change permanently (or over the long-term) affects the conservation status of a habitat/species, reducing or increasing the ability to sustain the habitat or the population level of the species within a given geographic area. Relative to the wider habitat resource/species population, a large area of habitat or large proportion of the wider species population is affected. For designated sites, integrity is compromised. There may be a change in the level of importance of the receptor in the context of the project.
Medium	Relative to the wider habitat resource/species population, a small-medium area of habitat or small-medium proportion of the wider species population is affected. There may be a change in the level of importance of this receptor in the context of the project.
Low	The quality or extent of designated sites or habitats or the sizes of species' populations, experience some small-scale reduction or increase. These changes are likely to be within the range of natural variability and they are not expected to result in any permanent change in the conservation status of the species/habitat or integrity of the designated site. The change is unlikely to modify the evaluation of the receptor in terms of its importance.
Very Low	Although there may be some effects on individuals or parts of a habitat area or designated site, the quality or extent of sites and habitats, or the size of species populations, means that they would experience little or no change. Any changes are also likely to be within the range of natural variability and there would be no short-term or long-term change to conservation status of habitats/species receptors or the integrity of designated sites.
Neutral	A change, the level of which is so low, that it is not discernible on designated sites or habitats or the size of species' populations, or changes that balance each other out over the lifespan of a project.

Determining Significance - Adverse and Beneficial Effects

8.9.11 Adverse effects are assessed as being significant if the favourable conservation status of an ornithological feature would be lost as a result of the Proposed Development. Beneficial effects are assessed as those where a resulting change from baseline improves the quality of the environment (e.g. increases species diversity, increases the extent of a particular habitat etc., or halts or slows down an existing decline). For a beneficial effect to be considered significant, the conservation status would need to positively increase in line with a magnitude of change of "high" as described in **Table 8.11**.

8.9.12 Conservation status is defined as follows (as per CIEEM, 2018):

- "*For habitats, conservation status is determined by the sum of the influences acting on the habitat that may affect its extent, structure and functions as well as its distribution and typical species within a given geographical area;*
- *For species, conservation status is determined by the sum of influences acting on the species concerned that may affect its abundance and distribution within a given geographical area*".

8.9.13 SNH (2018A) detail that a species' conservation status is favourable when:

- Population dynamics indicate that the species is maintaining itself on a long-term basis and is therefore likely to persist in the habitat it occupies; and
- The natural range of the species is not being reduced, nor is likely to be reduced for the foreseeable future; and
- There is (and will probably continue to be) a sufficiently large habitat to maintain its populations on a long-term basis.

8.9.14 SNH (2018a) recommends that the concept of maintaining a favourable conservation status of a species should be applied at the level of its Scottish population, to determine whether an impact is sufficiently significant to be of concern. This is a test which makes good ecological sense and maintains compatibility with the aims of European legislation and Government policy.

8.9.15 Nonetheless, developments should be assessed, alone or in combination, at a regional (or analogous scale) for their impacts on a species population size, trend and range. An adverse impact on a species at a regional scale (within Scotland) may adversely affect its national conservation status (for example where a specific region holds the majority of the national population). For wind farms which do not have an impact on designated sites, SNH (2018a) highlights the relevance of the NHZ as the basis for the geographical range selection, the boundaries of which have been drawn to reflect biogeographical differences between different zones, with a high level of environmental coherence within each zone. The Proposed Development is within NHZ 3 (Coll, Tiree and the Western Isles).

8.9.16 NHZ-level population estimates for a number of breeding bird populations and a number of estimates for key wintering waterfowl populations are available (*Wilson et al., 2015*).

8.9.17 In some cases, such as wintering goose and swan populations that are highly mobile, it may be necessary to undertake assessment at a much broader scale such as that of the entire Scottish population. Passage migrants and some wintering populations may show high levels of movement within the non-breeding season and it is therefore difficult to define coherent regional populations with any confidence. This would be especially true where there is substantial site-based turnover in species' populations.

8.9.18 Alternative geographical areas to NHZs may be acceptable as the basis for assessment where there are definable regional or biogeographical populations that do not conform to NHZ boundaries (for example the distinct regional populations of red kites in Scotland). For some migratory species patterns of migration may determine the spatial scale at which impacts should be considered, e.g. corncrakes migrate up the west coast of Ireland and Scotland and any impacts during migration would be likely to affect the population as a whole. In considering a species' distribution, it is important to consider its distribution across its range.

8.9.19 Regional populations may be of particular importance to a species conservation status at a national or international population because:

- They are core or 'stronghold' areas and the overall viability of the population is dependent on the maintenance of such areas; or
- They are 'edge of range' populations, which may (over time) be important in maintaining range as well as providing the potential for expansion or range shift.

8.9.20 For example, the Scottish golden eagle population encompasses areas that can be considered to be core and edge populations. The 'Golden eagle framework' indicates the variation in vulnerability of the golden eagle in both core and edge of range areas to additional impacts, such as those from wind farms, across Scotland.

8.9.21 The decision as to whether the conservation status of an ornithological feature would alter has been made using professional judgement, drawing upon the information produced through the desk study, field survey and assessment of how each feature is likely to be affected by the Proposed Development, by:

- Preventing a recovering species from reaching favourable conservation status, at a national or international level; or
- Changing a species' status from favourable to unfavourable; or

- For a species that is already in decline, the assessment should focus on whether the proposal would undermine the potential for halting its decline and allowing it to recover to favourable conservation status.

8.9.22 A similar approach is used where designated sites may be affected by the Proposed Development, except that the focus is on the effects on the integrity of each site; defined as:

- "*The coherent sum of the site's ecological structure, function and ecological processes, across its whole area, which enables it to sustain the habitats, complex of habitats and/or populations of species for which the site is designated.*".

8.9.23 The assessment of effects on integrity draws upon the assessment of effects on the conservation status of the features for which the site has been designated. Where these features are not clearly defined, which is often the case for non-statutory biodiversity sites, it is necessary to use professional judgement to identify the interest features or obtain additional information about these from SNH, Scottish Wildlife Trust or the Council responsible for identifying these sites, so that sufficient information on which to base an assessment is available.

8.9.24 The EIA Report should set out the consequences for the integrity of the species population in terms of its size, trend, distribution (where known) and the area of suitable habitat.

8.9.25 Whilst European sites, and their qualifying interest features are assessed within this EIA Report chapter as part of the wider EIA, conclusions on any potential adverse effects on site integrity based on identification of LSE for HRA purposes are addressed in the HRA (**Appendix 8H**), which takes precedence if there is any inadvertent inconsistency between this Chapter and the HRA.

8.10 Assessment of Effects: Lewis Peatlands Special Protection Area – Black-throated Diver

Baseline Conditions

Desk Study

8.10.1 Black-throated diver is a qualifying feature of the Lewis Peatlands SPA and Ramsar sites, is listed on Schedule 1 of the Wildlife & Countryside Act 1981 (as amended) and the Scottish Biodiversity List. This species is amber listed on Birds of Conservation Concern 4 (*Eaton et al. 2015*) due to being a rare breeding bird.

8.10.2 The black-throated diver population in Scotland is estimated at 176 (range 123 to 245) breeding pairs (*Wilson et al. 2015*). The UK breeding population is entirely confined to western and northern Scotland, with the main concentrations in Sutherland, Wester Ross and the Outer Hebrides (*Gibbons et al. 1993*). The breeding population increased 16% between 1994 and 2006 (*Eaton et al. 2007*), and on the Western Isles the rise in population between 1994 and 2006 was 52% which is a greater rise than in other areas of the UK. This population rise may still be occurring as the number of apparently suitable waterbodies (albeit with unknown prey levels) is large.

8.10.3 The Lewis Peatlands SPA citation notes that it supports 12 pairs, c. 7% of the Scottish breeding population, and the population was considered as favourable maintained in the most recent site condition assessment (2004).

8.10.4 During surveys carried out in 2009 to inform the 2012 Stornoway Wind Farm application, two black-throated diver nests were located within the survey area, one of which was within the SPA. No nests were located during breeding surveys in 2016, with just a single record of an adult within the survey area obtained.

8.10.5 Flight activity of black-throated diver in 2009 recorded during VP watches and focal watches overlooking active breeding sites showed that the greatest level of flight activity was focussed on the central and southern areas of the Development Site, with further areas of high activity to the north east. These areas have a high density of lochs and lochans, with birds showing signs of prospecting for nesting locations, socialising and undertaking foraging trips. No flights were recorded during surveys in 2016.

Field Surveys

8.10.6 Field surveys were carried out from April – September 2018, and full details are provided in **Appendix 8D: Confidential Annex**.

Breeding Diver Surveys 2018

8.10.7 Three breeding attempts were recorded during 2018Pair A was recorded within the Development Site;

- Pair B was located on the edge of the Lewis Peatlands SPA boundary and was approximately 1km from the Development Site;
- Pair C was located approximately 2km from the Development Site boundary.

8.10.8 Records indicate that breeding attempts for Pair A and B failed, whilst Pair C may possibly have fledged two chicks. Pair A appeared to fail at the chick stage. A scrape was found on the loch associated with Pair B on the 25th May but no further evidence was recorded.

8.10.9 The data also shows that black-throated diver utilised a number of additional lochs for non-breeding purposes.

Flight Activity Surveys 2018

8.10.10 Black-throated diver flight activity from VP and focal watch surveys shows that the majority of flights occurred around and between breeding and non-breeding lochs that were being used as feeding lochs.

8.10.11 **Table 8.12** presents a summary of flight activity recorded within a 500m buffer of the Development Site boundary during VP and focal watch surveys, including the amount of time at and above/below potential collision height (PCH)[11].

Table 8.12 Black-throated Diver: VP and Focal Watch Flight Activity Data

	Season	Total Number Flights	Total Seconds Below PCH	Total Seconds at PCH	Total Seconds Above PCH
VP	Breeding	23	586	1,394	0
Focal watch	Breeding	9	495	315	0

Future Baseline

8.10.12 In the absence of development, the black-throated diver population is likely to be maintained at similar levels within the area. Reduced predation pressure due to the eradication of American mink

[11] PCH was taken as a precautionary 20-200m, covering height bands B and C.

may potentially lead to an increase in productivity, with any subsequent increase in the breeding population numbers being supported by the abundance of alternative large fresh-water bodies in the area.

Predicted Effects and their Significance

Operation: Barrier to Flights Leading to Displacement and Collision Risk

8.10.13 In terms of operational displacement associated with the Proposed Development acting as a barrier to flights, the low levels of flight activity shown in **Table 8.12**, indicates that there is little potential for barrier effects to occur in relation to flight activity from SPA birds. Even if the Proposed Development does act as a barrier and birds fly around or over it, the additional energy expenditure required to do so for the relatively few flights recorded would not be expected to have a discernible effect given the relatively small additional flight distances involved. On this basis, the Proposed Development would result in a low magnitude of change. The effects would be not significant, there is no adverse significant effect on the Lewis Peatlands SPA site's integrity.

8.10.14 With the exception of barrier related effects during operation leading to displacement and collision risk, no other effects, whether construction/decommissioning or operation related, were scoped in for assessment as no breeding attempts associated with the SPA population were found within the 750m ZoI (**Appendix 8E**).

8.11 Assessment of Effects: Lewis Peatlands Special Protection Area – Golden Eagle

Baseline Conditions

Desk Study

8.11.1 Golden eagle is a qualifying feature of the Lewis Peatlands SPA, is listed on Annex I of the Birds Directive, Schedule 1, 1A and A1 of the Wildlife & Countryside Act 1981 (as amended), and the Scottish Biodiversity List. This species was amber listed on Birds of Conservation Concern 3 (*Eaton et al, 2009*), but has been moved onto the green list in the recently published Birds of Conservation Concern 4 (*Eaton et al. 2015*).

8.11.2 Within Scotland, there are an estimated 508 occupied home ranges, based on a national survey carried out in 2015 (*Challis et al, 2016*). The Lewis Peatlands SPA citation is for 5 pairs, c. 1 % of the Scottish breeding population (*Wilson et al, 2015; Challis et al 2016*), and the population was considered as favourable maintained in the most recent site condition assessment (2015).

8.11.3 There are two pairs within the SPA that hold breeding territories within 6km of the Development Site. These are known as Pair A and Pair B (see **Confidential Appendix D** for further information). Pair A is known to have made breeding attempts in three distinct locations; two of these locations have been used historically, whilst the third was the site of a new nest built in 2015. A single chick was fledged successfully from this new nest location in 2016. This new location is approximately 1.2km from the closest proposed turbine and access track, closer than previous nest locations.

8.11.4 Pair B is known to have made nesting attempts in two locations, although they are thought to have failed to produce fledged young for a considerable period (over 20 years). This pair has shown signs of breeding regularly, although reaching the egg laying phase has been sporadic. One of these nesting locations is historic and has not been built up in many years (over 10 years); nothing now remains of the nest previously constructed at this location. The nearest nest location is approximately 3.9km from the closest proposed turbine and access track.

8.11.5 During the 2009-2010 flight activity surveys for the 2012 Stornoway Wind Farm application, golden eagle were recorded throughout the Development Site but with a concentration in the north-west part of the survey area. Of the 187 flights, at least 59 were of sub-adult, 42 by adult birds with the remainder not being aged due to visibility issues (e.g. identified in silhouette). The total number of individuals using the Development Site was unknown, but from plumage characteristics and observing more than one bird simultaneously it was thought that at least six individuals were recorded (comprising two adults, three sub-adults and one juvenile).

8.11.6 Surveys undertaken in 2015-2016 indicated that the levels of activity were considerably less than that recorded from the same location in 2009 – 2010, with the main areas of activity being north of the Pentland Road Wind Farm, with the majority of the 13 recorded flights noted approximately 2km from the Development Site.

Field Surveys

8.11.7 Field surveys were carried out from October 2017 – September 2019, and full details are provided in **Appendix 8B, Appendix 8C, Appendix 8D - Confidential Annex and Appendix 8F**.

Breeding Raptor Surveys

8.11.8 In 2018, there was no evidence of successful breeding for either Pair A or B.

Flight Activity Surveys 2017-18

8.11.9 Golden eagle flight activity from VP surveys shows that there were two main areas of activity. One of these fell outside of the survey area, whilst the second fell to the east and south of Pentland Road Wind Farm within the survey area. There were also occasional flights across the Development Site itself.

8.11.10 **Table 8.13** presents a summary of flight activity recorded within the Collision Risk Zone (CRZ[12]) during VP and focal watch surveys.

Table 8.13 Golden Eagle: VP Flight Activity Data

Season	Total Number Flights	Total Seconds Below PCH	Total Seconds at PCH	Total Seconds Above PCH
Non-breeding (October 2017-January 2018)	12	90	959	0
Breeding (February – August 2018)	33	732	2,456	789

Future Baseline

8.11.11 In the absence of development, golden eagle are likely to continue to maintain their present population levels within the area. Given the age of Pair B, it is probable that the natural death of

[12] The collision risk zone (CRZ) is defined as the wind farm polygon, taken as the perimeter of the Development Site Boundary plus a 500 m buffer. SNH guidance currently recommends a 500 m buffer to allow for observer inaccuracies when mapping flights during surveys (SNH, 2017b).

either mate may lead to a new pair bond being established within this territory, potentially leading to an increase in productivity for this territory.

Predicted Effects and their Significance

Potential Collision with Operational Turbines

8.11.12 No other construction or operational effects were scoped in for further assessment (**Appendix 8E**).

8.11.13 The low levels of flight activity shown in **Table 8.13** were subject to CRM which resulted in a combined theoretical collision risk of 0.16 fatalities per year (**Appendix 8F**), equating to 1.6 % of the SPA population. A simple population model indicates that this level of additional mortality would not lead to a reduction in the population of the SPA over the lifetime of the wind farm (**Appendix 8G**).

8.11.14 Furthermore, evidence suggests that golden eagle actively avoid wind turbines (Walker et al, 2005) and so it is probable that actual collision risks will be lower than predicted here. Hotker et al (2006) found only 1 reported casualty of a golden eagle due to a collision with a wind turbine in Spain.

8.11.15 On this basis, the Proposed Development would result in a low magnitude of change. Effects would therefore be not significant and there would be no adverse significant effect on the Lewis Peatlands SPA site's integrity.

8.12 Assessment of Effects: Lewis Peatlands Special Protection Area – Greenshank

Baseline Conditions

Desk Study

8.12.1 Greenshank is a qualifying feature of the Lewis Peatlands SPA and Ramsar sites, and is listed on Schedule 1 of the Wildlife & Countryside Act 1981 (as amended). This species was green listed on Birds of Conservation Concern 3 (*Eaton et al 2009*), but has been moved onto the amber list in the recently published Birds of Conservation Concern 4 (*Eaton et al. 2015*) due to its localised breeding population.

8.12.2 The Scottish population of greenshank is estimated to be 1,297 breeding pairs, and the Lewis Peatlands SPA supports 140 pairs, c 11 % of the Scottish breeding population (*Wilson et al 2015*). The SPA population was considered as favourable maintained in the most recent site condition assessment (2015).

8.12.3 Five greenshank territories were noted within the survey area in 2009, three of which were associated with the Lewis Peatlands SPA. The other two territories were located in the south-east corner of the survey area. All territory centres recorded were greater than 500m from a turbine location. Of the 42 greenshank flights noted the majority were outside of the turbine envelope; no flights at collision risk height were noted within 250m of any of the proposed turbine locations.

8.12.4 A single pair of greenshank were recorded in 2016 within the potential north west extension area (see **Appendix 8A,** Section 2.2.

Field Surveys

8.12.5 Field surveys were carried out from October 2017 - September 2018, and full details are provided in **Appendix, Appendix 8C, Appendix 8D - Confidential Annex and Appendix 8F**.

Breeding Wader Surveys 2018

8.12.6 Based on the method of Hancock (1997) for deriving population estimates from survey data, an estimated maximum of six pairs were present within the moorland bird survey (MBS) area (**Appendix 8D**) during the 2018 breeding season (March – July 2018 as specified by SNH (2017)). Most activity was distributed within the 500m buffer outside of the Development Site boundary, overlapping the SPA boundary.

Flight Activity Surveys 2018

8.12.7 Greenshank were recorded intermittently across the survey area during breeding season VP surveys, with a total of nine flights recorded within the CRZ totalling 509 seconds at PCH. Flights did not follow any real pattern in distribution (**Appendix 8D**).

8.12.8 **Table 8.14** presents a summary of flight activity recorded within the CRZ during VP and focal watch surveys.

Table 8.14 Greenshank: VP Flight Activity Data

Season	Total Number Flights	Total Seconds Below PCH	Total Seconds at PCH	Total Seconds Above PCH
Breeding (March – July 2018)	9	30	509	0

Future Baseline

8.12.9 In the absence of development, greenshank are likely to continue to maintain their present population levels within the area. However, reduced predation pressure due to the eradication of American mink may lead to an increase in productivity, with any subsequent increase in the breeding population numbers being supported by the abundance of suitable breeding habitat within the SPA.

Predicted Effects and their Significance

Construction and Decommissioning Disturbance

8.12.10 Three pairs of SPA breeding greenshank fall within the ZoI, equivalent to 2.1 % of the SPA population.

8.12.11 Construction and decommissioning related disturbance/displacement effects to greenshank that may be connected to the SPA would be minimised via the embedded measures outlined in **Table 8.10.** with disturbance to nesting birds being unlikely.

8.12.12 Due to the extent of available habitat within the SPA that would remain undisturbed during construction and decommissioning, availability of foraging and breeding habitat is not considered to be a limiting factor. Given the temporary nature of the construction/decommissioning works and that the magnitude of change to the Lewis Peatlands SPA greenshank population is considered to be very low, the effects would be not significant, and there would be no adverse significant effect on the Lewis Peatlands SPA site integrity.

8.12.13 No other construction or operational effects were scoped in for further assessment (**Appendix 8E**).

8.13 Assessment of Effects: Lewis Peatlands Special Protection Area – Red-throated Diver

Baseline Conditions

Desk Study

8.13.1 Red-throated diver is a qualifying feature of the Lewis Peatlands SPA and Ramsar sites, is listed on Schedule 1 of the Wildlife & Countryside Act 1981 (as amended) and the Scottish Biodiversity List. This species was amber listed on Birds of Conservation Concern 3 (*Eaton et al 2009*), but has been moved onto the green list in the most recently published Birds of Conservation Concern 4 (*Eaton et al. 2015*).

8.13.2 Scotland supports approximately 1,268 breeding pairs of red-throated diver and the Lewis Peatlands SPA citation is for 80 pairs, c 6.3 % of the Scottish breeding population (*Wilson et al 2015*). The population was considered as unfavourable declining in the most recent site condition assessment (2004).

8.13.3 Red-throated diver breed widely across the Isle of Lewis, with a number of known nest locations/breeding areas (recorded at various scales) being located within and around the Development Site. The species is known to change between favoured breeding locations between years. There are seven known historical breeding locations (based on kilometre squares) that are either within the Consented Development site or are due west of it (within the SPA). In years for which data are available no more than three of these sites were occupied simultaneously.

8.13.4 Breeding surveys for the Stornoway Wind Farm in 2009 recorded divers or diver signs (nest scrapes) at seven locations, one of which was located within the Development Site boundary with a further five located within the SPA to the north and west. Breeding was confirmed at three of these locations (all within the SPA, two locations to the north of the site and one to the south west). None of these sites supported a successful breeding attempt.

8.13.5 In 2016, divers or diver signs were recorded at four locations, all within the SPA, with a juvenile recorded at one site. Activity was recorded at two of the same locations in 2009 and 2016.

8.13.6 Red-throated diver flight activity recorded in 2009 during VP watches and focal watches overlooking active breeding sites showed that the greatest level of flight activity was focussed on the central and southern areas of the Consented Development, with further areas of high activity to the north east. These areas have a high density of lochs and lochans, with birds showing signs of prospecting for nesting locations, socialising and undertaking foraging trips to the coast. During surveys in 2016, flight activity was focussed on the single confirmed breeding location.

Field Surveys

8.13.7 Field surveys were carried out from April – September 2019, and full details are provided in **Appendix 8D - Confidential Annex**.

Breeding Diver Surveys 2018

8.13.8 There was one breeding pair of red-throated divers within the Development Site in 2018 with a further three pairs within 1km of the Development Site (**Appendix 8D**)[13]. All four pairs fell within the Lewis Peatlands SPA. Records indicate that breeding attempts were successful.

8.13.9 The data also shows that red-throated diver utilise a number of additional lochans within and adjacent to the Development Site for non-breeding purposes (e.g. loafing and foraging).

Flight Activity Surveys 2018

8.13.10 Red-throated diver flight activity recorded from VP and focal watch surveys shows that the majority of flights occurred around and between breeding and non-breeding lochs as well as movements of birds off-site towards coastal feeding areas (**Appendix 8D, 8F**).

8.13.11 **Table 8.15** presents a summary of flight activity recorded within the CRZ during VP and focal watch surveys.

Table 8.15 Red-throated Diver: VP and Focal Watch Flight Activity Data

	Season	Total Number Flights	Total Seconds Below PCH	Total Seconds at PCH	Total Seconds Above PCH
VP	Breeding (April – August)	119	1,605	12,033	15
Focal watch	Breeding May – July)	165	3,665	10,437	3,945

Future Baseline

8.13.12 In the absence of development, red-throated diver are likely to continue to maintain their present population levels within the area. However, reduced predation pressure due to the eradication of American mink may lead to an increase in productivity (possibly the 100% success rate recorded in 2018 may be a reflection of this), with any subsequent increase in the breeding population numbers being supported by the abundance of alternative large fresh-water bodies in the area.

Predicted Effects and their Significance

Construction and Decommissioning Disturbance

8.13.13 One pair of SPA red-throated diver falls within the ZoI, being equivalent to 1.2 % of the SPA population. Construction and decommissioning related disturbance/displacement effects on red-throated diver within the ZoI would be temporary and sporadic and in light of the embedded measures outlined in **Table 8.10** impact magnitude would be very low.

8.13.14 Due to the extent of available habitat within the SPA that would remain undisturbed during construction and decommissioning, the availability of foraging and breeding habitat is not considered to be a limiting factor. Given the temporary nature of the construction works, the magnitude of change to the Lewis Peatlands SPA red-throated diver population is considered to be very low. On this basis, effects would be not significant and there would be no adverse significant effect on the Lewis Peatlands SPA site's integrity.

[13] A fifth pair were recorded beyond 1km from the Development Site.

Operation: Barrier to Flights Leading to Displacement

8.13.15 The Proposed Development has the potential to act as a barrier to red-throated divers undertaking foraging flights between breeding lochs within the SPA and coastal feeding areas. Flight activity surveys in 2018 highlighted that birds from the two breeding locations within the SPA to the west of the Development Site were taking a direct route to coastal feeding areas, and crossed the proposed turbine envelope.

8.13.16 The wind turbines within the Development Site are more widely spaced than in normal wind farm design and there are two potential corridors (one situated north of the Beinn Grideag Wind Farm, running east to Loch a Leadharain, and a second to the south heading south east towards Loch Briodag) that birds could utilise to fly through the Proposed Development.

8.13.17 However, evidence from offshore wind farms show that divers strongly avoid complex turbine arrays, and if this same behaviour applies here, birds will adjust their flight paths and/or flight height accordingly, potentially adding to the energy expenditure required. Calculations of energy expenditure indicate that the increased energy cost of avoiding a wind farm during flight is typically negligible: for example, increased energy costs of 0.2 – 0.7% have been calculated for migrating eider ducks passing offshore wind farms in Denmark (Petersen et al. 2006) and Sweden (Pettersson 2005). Low costs have been calculated for other migrating seabirds as well (Desholm & Kahlert 2005, Christensen et al. 2006, Masden et al. 2012), including red-throated divers. However, the cumulative energy cost from avoidance over multiple flights may have significant impacts on individual fitness (Masden et al. 2010). Given that breeding red-throated divers fly from their inland breeding lochs to foraging grounds at sea an average of 11 times per day to feed a single chick during the pre-fledging period (Reimchen and Douglas 1984), wind farms located between breeding and foraging sites may significantly increase the energy cost of reproduction for breeding red-throated divers (Masden et al. 2010, Schuster et al. 2015).

8.13.18 However, a range of evidence shows that barrier effects do not have a significant negative effect. Divers may often have circuitous commuting routes in order to reach feeding sites, without any reduction in productivity. Commuting distances up to 13km were recorded during surveys in 2009 (Stornoway Wind Farm ES 2012). Gomersal (1987) found no significant effects on distance between the nest and the sea on breeding success in Shetland. Given the distribution of confirmed breeding lochs and the flights paths present at Stornoway, the additional flight length required to fly around the Proposed Development is limited

8.13.19 Should barrier effects stop red-throated divers utilising the flight corridors that have been incorporated into the design of the Proposed Development, any additional energy expenditure required to fly around the Proposed Development is not considered significant, and , the magnitude of change in respect of potential barrier effects on the SPA population of red-throated diver would be no more than low. On this basis, effects would be not significant and there would be no adverse significant effect on the Lewis Peatlands SPA site's integrity.

Potential Collision with Operational Turbines

8.13.20 The flight activity recorded from focal watch surveys at four breeding locations (**Table 8.15)** was subject to CRM and this resulted in a theoretical annual collision risk of 0.43 (**Appendix 8G**), equating to 0.27 % of the SPA population.

8.13.21 A simple population model was created, which indicates that this level of additional mortality would still allow the Lewis Peatlands SPA population to increase over the lifetime of the wind farm (**Appendix 8G**).

8.13.22 On this basis, the Proposed Development would result in a low magnitude of change. The effects would be not significant and there would be no adverse significant effect on the Lewis Peatlands Ramsar site's integrity.

8.14 Assessment of Effects: Lewis Peatlands Ramsar – Black-throated Diver

8.14.1 The assessment for the Ramsar black-throated diver population is considered to be consistent with that carried out for the SPA population, given that the site boundaries are the same.

8.14.2 The effects would be not significant, there is no adverse significant effect on the Lewis Peatlands Ramsar site's integrity.

8.15 Assessment of Effects: Lewis Peatlands Ramsar – Greenshank

8.15.1 The assessment for the Ramsar greenshank population is considered to be consistent with that carried out for the SPA population, given that the site boundaries are the same.

8.15.2 The effects would be not significant, there is no adverse significant effect on the Lewis Peatlands Ramsar site's integrity.

8.16 Assessment of Effects: Lewis Peatlands Ramsar – Red-throated Diver

8.16.1 The assessment for the Ramsar red-throated diver population is considered to be consistent with that carried out for the SPA population, given that the site boundaries are the same.

8.16.2 The effects would be not significant, there is no adverse significant effect on the Lewis Peatlands Ramsar site's integrity.

8.17 Black-throated Diver: Breeding

Baseline Conditions

Desk Study

8.17.1 NHZ 3 supports approximately 35 pairs (range 19-55) of black-throated diver (*Wilson et al. 2015*), approximately 20% of the national population.

8.17.2 Refer to **Section 8.11** for further information on status and data from the desk study.

Field Surveys

8.17.3 Refer to **Section 8.11** for further information on status and data from the field surveys.

Future Baseline

8.17.4 Refer to **Section 8.11** for further information.

Predicted Effects and their Significance

Construction and Decommissioning Disturbance

8.17.5 One breeding pair of black-throated diver falls within the ZoI (112m from the nearest turbine, 119m from the nearest construction compound and 170m from the nearest borrow pit). This is equivalent to 2.9 % of the NHZ population.

8.17.6 Construction and decommissioning related disturbance/displacement effects for black-throated diver within the ZoI would be temporary and sporadic and in light of the embedded measures outlined in **Table 8.10** impact magnitude would be very low.

8.17.7 Due to the extent of available habitat within NHZ 3 that would remain undisturbed during construction and decommissioning, availability of foraging and breeding habitat is not considered to be a limiting factor.

8.17.8 Given the temporary nature of the construction works, the magnitude of change to the NHZ 3 black-throated diver population is considered to be very low, and the resultant effect on the species' conservation status is not significant.

Operation: Barrier to Flights Leading to Displacement and Collision Risk

8.17.9 The low levels of flight activity shown in **Table 8.12** indicate that there is little potential for barrier effects to occur in relation to flight activity from NHZ 3 birds.

8.17.10 The Proposed Development would result in a very low magnitude of change. Therefore the effects would be not significant and there would be no adverse significant effect on the favourable conservation status of black-throated diver.

8.18 Common Tern: Breeding

Baseline Conditions

Desk Study

8.18.1 Common tern is listed on Annex 1 of the Birds Directive, the Scottish Biodiversity List and is an Amber listed BoCC due to at least 50 % of the UK breeding population being located within 10 or fewer sites (*Eaton et al 2015*).

8.18.2 There is no figure available for the NHZ population but an estimated 502 pairs were considered to be breeding on the Western Isles in 2000, representing approximately 10% of the Scottish population of 4,784 pairs (*Mitchell et al, 2004*).

Field Surveys

Breeding Bird Surveys 2018

8.18.3 In 2018, a breeding colony of approximately 50 pairs was recorded on an island located on Loch a Chlachain within the Development Site (**Appendix 8C**).

Flight Activity Surveys 2018

8.18.4 Common tern flight activity was focussed along a regular flight corridor that followed the River Creed from the breeding colony at Loch a Chlachain down to coastal foraging areas. A total of 60 flights were recorded within the CRZ during VP surveys between April – August (**Appendix 8F**), with a total of 66 birds at PCH (**Table 8.16**).

Table 8.16 Common Tern: VP Flight Activity Data

Season	Total Number Flights	Total Number Birds	Total Number Birds at PCH
Breeding	60	145	66

Future Baseline

8.18.5 In the absence of development, common tern are likely to continue to maintain their present population levels within the area. However, reduced predation pressure due to the eradication of American mink may lead to an increase in productivity with any subsequent increase in the breeding population numbers being supported by the abundance of alternative islands within large fresh-water bodies in the area.

Predicted Effects and their Significance

Operation: Barrier to Flights Leading to Displacement

8.18.6 The Proposed Development has the potential to act as a barrier to common tern undertaking foraging flights between the breeding colony and coastal feeding areas, utilising a regular flight corridor that followed the River Creed. This could affect up to 50 pairs, which represents c 10% of the Western Isles population in 2000.

8.18.7 The wind turbines within the Proposed Development are widely spaced and a corridor has been built into the design along the River Creed, with the nearest turbine being c 200m away, suggesting that any impediment to use of this flight corridor would be unlikely.

8.18.8 As there is a flight corridor within the final design, and the turbines are widely spaced the magnitude of change due to the barrier effect on the NHZ population of common tern would no more than low. Furthermore, it is likely that the Western Isles population has increased since 2000 due to the eradication of American mink, and therefore any effect would be reduced due to the greater productivity that has followed eradication of mink.

8.18.9 The Proposed Development would result in a low magnitude of change. Therefore, the effects would be not significant and there would be no adverse significant effect on the favourable conservation status of common tern.

Potential Collision with Operational Turbines

8.18.10 The flight activity recorded from VP surveys (**Table 8.17)** was subject to CRM which resulted in a theoretical annual collision risk of 0.174 (**Appendix 8F – CRM**), equating to 0.02 % of the NHZ population.

8.18.11 The Proposed Development would result in a very low magnitude of change in respect of collision risk. Therefore the effects would be not significant and there is no adverse significant effect on the favourable conservation status of common tern.

8.19 Hen Harrier: Breeding

Baseline Conditions

Desk Study

8.19.1 Breeding hen harrier is listed on Annex I of the Birds Directive, Schedule 1 and 1A of the Wildlife & Countryside Act 1981 (as amended) the Scottish Biodiversity List, and is a Red listed BoCC due to a historical decline in the breeding population (*Eaton et al 2015*).

8.19.2 The Scottish population of hen harrier was estimated to be 501 breeding pairs, with 48 in NHZ 3 (*Wilson et al. 2015*), based on data collected during a national survey in 2010.

8.19.3 A more recent national survey was carried out in 2016, and the Scottish population was estimated to be 460 pairs of hen harrier (*Challis et al. 2018a*). The 2016 data indicated that there were 43 territories in the Western Isles, four of which were on the Isle of Lewis (figures were not provided at the NHZ level).

8.19.4 Although there is a thriving population of hen harrier on the Uists, further south on the Outer Hebrides, there are no records of this species nesting on the Isle of Lewis before 2015, when a single breeding attempt was recorded. All breeding activity on Lewis has been recorded within a 2km buffer of the Development Site and all within OS 10km grid square NB 33.

Field Surveys

Breeding Bird Surveys 2018

8.19.5 Based on the data provided from breeding surveys and flight activity surveys in 2018 (**Appendix 8C, 8D and 8F**), the survey area supported five pairs of breeding hen harrier, representing approximately 1% of the Scottish breeding population, 10% of the NHZ regional breeding population (2010 national survey data), and approximately 12% of the Western Isles population (2016 national survey data).

8.19.6 Two of these nests failed, whilst the remaining three nests fledged at least 9 offspring. Three of these nests were located within a mosaic of failed coniferous plantation forestry and modified bog, one within failed coniferous plantation forestry and one within blanket bog. These forestry areas were originally planted over 30 years ago and have failed to become established, leading to slow growth, dead standing and fallen trees and an open / gappy habitat creating a mixed mosaic within the surrounding habitats.

8.19.7 Given the proximity of the nesting locations, it is probable that there was one home range that was occupied in 2015, 2016 and 2018, although the nest failed in 2016 and 2018. Additionally, a further two 2018 breeding attempts are in close proximity to nest sites recorded in 2016.

Flight Activity Surveys 2018

8.19.8 **Table 8.17** presents a summary of flight activity recorded within the CRZ during VP and focal watch surveys.

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Table 8.17 Hen Harrier: VP Flight Activity Data

	Season	Total Number Flights	Total Seconds Below PCH	Total Seconds at PCH	Total Seconds Above PCH
VP	Breeding (April – August)	108	9,682	3,628	120
Focal watch	Breeding (April - August)	165	14,330	5,577	90

8.19.9 Vantage Point and focal watch flight activity surveys have shown that the most intensive use of the Development Site at PCH peaks in April-June during the breeding season (see **Figure 8.1** below).

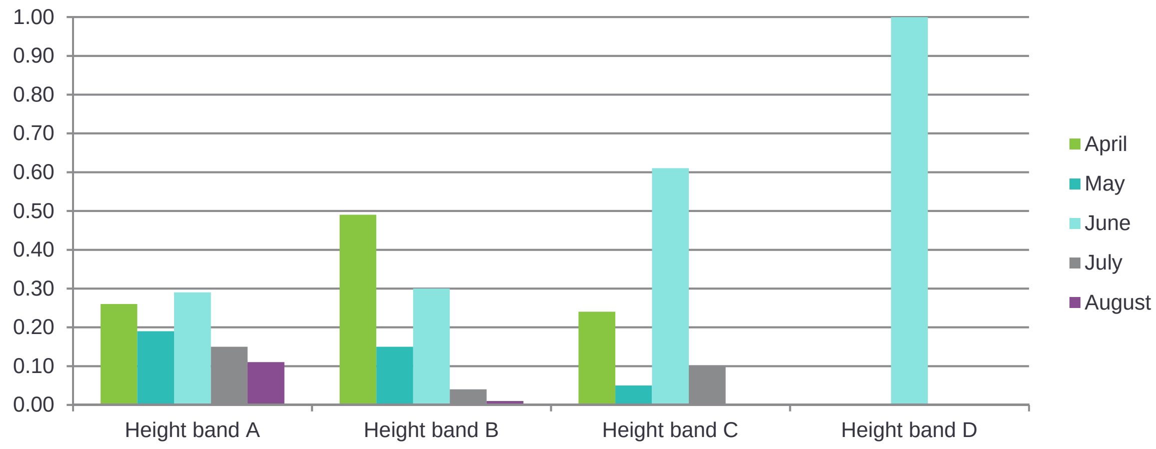

Figure 8.1 Hen Harrier: Proportion of Flight Activity 2018 Breeding Season

8.19.10 The greatest proportion of flight activity recorded at height band B (20m-100m) during the 2018 breeding season was in April, accounting for approximately 50% of all activity recorded at that height band during the breeding season, whilst June contributed 30% of height band B and 60% of height band C (100m-200m). Flights at height band D (>200m) were only recorded within June.

8.19.11 Activity was focussed in a 1-2km^2 area around each nest location, whilst the most favoured habitats over which flight activity was focussed were areas of failed coniferous plantation forestry and a mosaic of failed coniferous plantation forestry/ modified bog habitats (see **Figure 8.2** below).

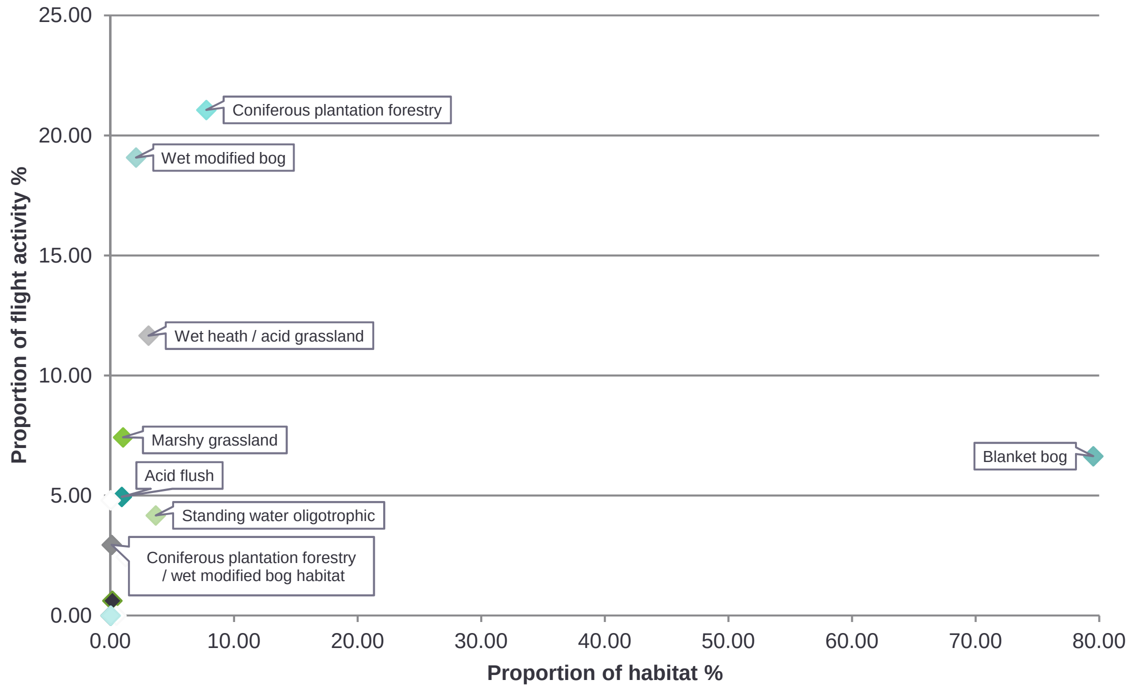

Figure 8.2 Hen Harrier: Proportion of Flight Activity by Habitat Type 2018 Breeding Season

8.19.12 Although blanket bog was clearly the predominant habitat type recorded on site (almost 80%), it only accounted for 6.6% of flight activity/ha during the breeding season and flight activity levels peaked above plantation coniferous woodland habitats, which accounted for only 7.8% of all available habitat.

Future Baseline

8.19.13 In the absence of development, the newly established hen harrier breeding population is likely to in the short term, continue to maintain their present population levels within the area. However, reduced predation pressures due to the eradication of American mink may lead to a longer-term increase in productivity, allowing the population to expand to other areas on Lewis.

Predicted Effects and their Significance

Construction and Decommissioning Disturbance

8.19.14 Three breeding pairs of hen harrier fall within aZoI (0m, 128m and 365mrespectively). This is equivalent to 6.25% of the NHZ population and 7% of the Western Isles population.

8.19.15 Construction and decommissioning related disturbance/displacement effects to hen harrier within the ZoI would be temporary and sporadic and in light of the embedded measures outlined in **Table 8.10**, the magnitude of change to the NHZ 3 hen harrier population is considered to be low, and the resultant effect on the species conservation status is not significant.

Operational Disturbance

8.19.16 In terms of operational disturbance, three breeding pairs of hen harrier fall within the ZoI (0m, 128m and 365m respectively). This is equivalent to 6.25% of the NHZ population and 7% of the Western Isles population.

8.19.17 In light of the embedded measures outlined in **Table 8.10,** operational related disturbance and displacement effects to hen harrier within the ZoI would be of low magnitude of change. There is an increasing body of evidence that hen harriers can successfully breed within close proximity to wind farms, and there are examples from different Scottish wind farms where young have fledged at nests closer within 30m from operational turbines. From a study of a number of wind farm sites, Haworth and Fielding (2014) found little evidence that turbines restrict hen harrier nesting attempts except, perhaps, at a distance of 0m - 200/250m. Furthermore, one of the territories monitored in 2018 was located less than 350m from a currently operational turbine, indicating that hen harrier habituate to the presence of operational turbines.

8.19.18 Thus, the magnitude of change to the NHZ 3 hen harrier breeding population is considered to be very low. Therefore the effects would be not significant and there would be no adverse significant effect on the favourable conservation status of hen harrier.

Potential Collision with Operational Turbines

8.19.19 As detailed within **Appendix 8E**, the CRM (**Appendix 8F**) calculated an annual CRM of 0.38 (which included all flights from VP surveys within CRZ at PCH) representing 0.16% of the NHZ population. Therefore it is anticipated that there will be no potential for significant effects on the NHZ population and potential collision with operational turbines was scoped out of any further assessment.

Operational Displacement Leading to Barrier Effects

8.19.20 The data reviewed by Haworth and Fielding (2014) does not provide any evidence of a barrier effect. Any displacement, which appears to be mainly foraging flights rather than direct flights, was considered to be small scale. The evidence indicated that foraging was reduced close to turbines, but this may be due to the presence of large areas of hard standings that significantly reduces foraging opportunities rather than any turbine avoidance behaviour. Therefore it is considered to be ow magnitude.

8.19.21 On this basis, any effects would be not significant and there is no adverse significant effect on the favourable conservation status of hen harrier.

8.20 Hen Harrier: Non-breeding

Baseline Conditions

Desk Study

8.20.1 There is little information on numbers of hen harriers in the UK outside the breeding season, although Forrester estimated that Scotland held between 1,050-1540 individuals (*Forrester et al. 2007*).

8.20.2 At the time of the 2009-2010 surveys, hen harrier was a common winter visitor to Lewis, and flight activity surveys at the time recorded 58 flights, only one of which was observed during the breeding season. Flight activity surveys during the 2015-2016 winter period recorded three flights.

8.20.3 Refer to **Section 8.19** for further information on hen harrier status and data from the desk study.

Field Surveys

Non-breeding Bird Surveys 2017-18

8.20.4 In November 2017, activity recorded during VP surveys and incidental observations whilst accessing the Site indicated that there appeared to be a number of hen harriers utilising parts of the Site as nocturnal roosts. Roost monitoring watches were established to determine the status of these areas and two areas in the central part of the Development Site were identified as being utilised for roosting by up to 6 individual hen harriers; comprising an adult female, two adult males and at least three ringtails[14] (**Appendix 8B, 8D)**. This is the equivalent to approximately 0.6% of the Scottish non-breeding population.

Flight Activity Surveys 2017-18

8.20.5 **Table 8.18** presents a summary of flight activity recorded within the CRZ during VP and focal watch surveys.

Table 8.18 Hen Harrier: VP Flight Activity Data Non-breeding 2017-2018

	Season	Total Number Flights	Total Seconds Below PCH	Total Seconds at PCH	Total Seconds Above PCH
VP	Non-breeding (October - March)	35	2,468	915	0
Roost monitoring	Non-breeding (October – March)	14	1,350	60	0

8.20.6 Vantage Point and focal watch flight activity surveys have shown that the most intensive use of the Development Site at PCH (taken as a precautionary 20-200m, covering height bands B and C) peaks in November-December during the non-breeding season (**Figure 8.3**).

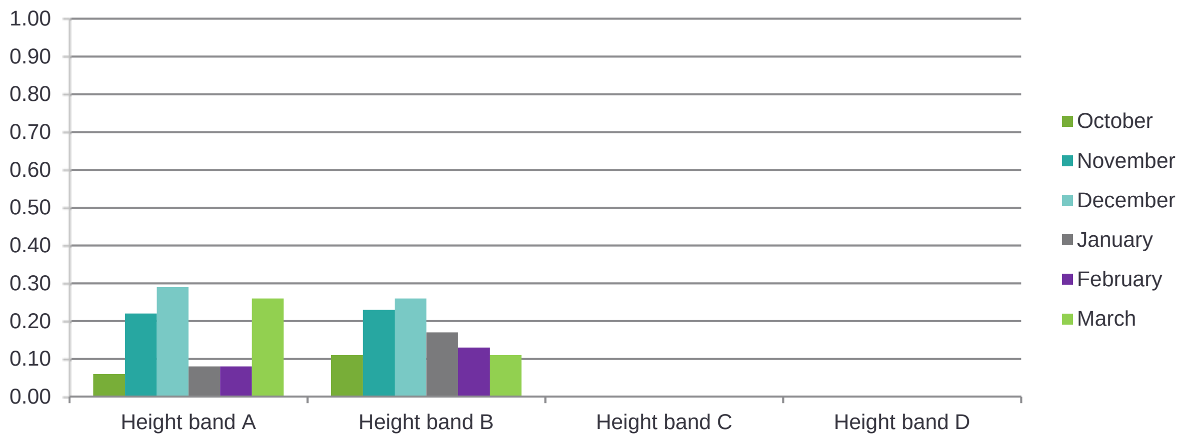

Figure 8.3 Hen Harrier: Proportion of Flight Activity; Non-breeding Season 2017-2018

8.20.7 The greatest weighted proportion of flight activity recorded at PCH during the 2017-2018 non-breeding season was in December, accounting for approximately 25% of all activity recorded in height band B during the non-breeding season, whilst no flights were recorded at height band C. March 2018 saw an increase in flight activity at height band A.

[14] Collective term for females and immature birds (male and female).

8.20.8 Activity was recorded across the survey area, although there was a focus around the roosting areas.

8.20.9 The most favoured habitats over which flight activity was focussed were areas of failed coniferous plantation forestry and a mosaic of failed coniferous plantation forestry / modified bog habitats (**Figure 8.4**).

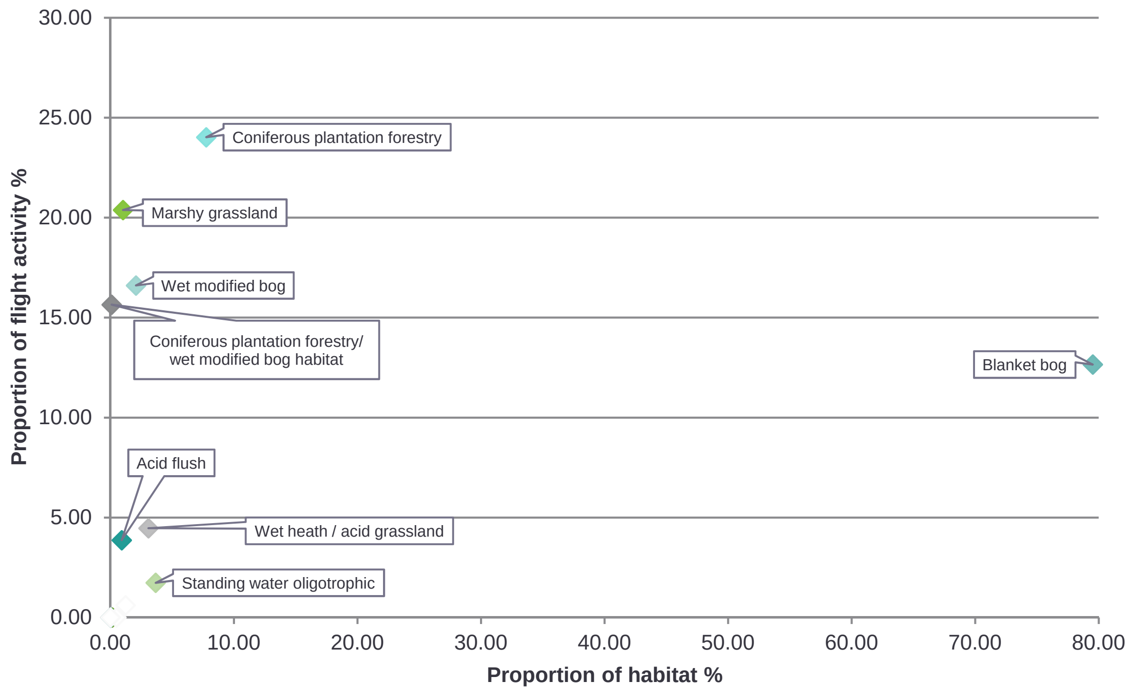

Figure 8.4 Hen Harrier: Proportion of Flight Activity by Habitat Type; Non-breeding Season 2017-2018

8.20.10 Although blanket bog was clearly the predominant habitat type recorded on site (almost 80%), it only accounted for 12.7% of flight activity during the non-breeding season. Flight activity levels peaked in failed coniferous plantation forestry habitats (24.1%), which accounted for only 7.8% of all available habitat.

Future Baseline

8.20.11 In the absence of development, the hen harrier non-breeding population is likely to continue to maintain their present population levels within the area. However, reduced predation pressures due to the eradication of American mink may lead to a longer-term increase in breeding productivity, which in turn may lead to an increase in the numbers of non-breeding hen harriers on Lewis.

Predicted Effects and their Significance

Construction and Decommissioning Disturbance

8.20.12 In terms of construction and decommissioning disturbance, the hen harrier roosting locations fall within the ZoI (approximately 150m to 350m to proposed infrastructure at their nearest points). Based on a maximum occupancy of 6 birds, this is equivalent to 0.57% of the Scottish population.

8.20.13 Construction and decommissioning related disturbance/displacement effects to hen harrier within the ZoI would be temporary and sporadic and in light of the embedded measures outlined in **Table 8.10** impact magnitude would be very low. The magnitude of change to the NHZ 3 hen harrier population is therefore considered to be very low and there would be no adverse significant effect on the favourable conservation status of hen harrier.

Operational Disturbance

8.20.14 In light of the embedded measures outlined in **Table 8.10**, operational related disturbance and displacement effects to roosting hen harrier within the ZoI would be similar to those experienced by breeding hen harrier as when roosting they are as sensitive during the non-breeding season as when nesting during the breeding season.

8.20.15 Therefore, the magnitude of change to the NHZ 3 hen harrier non-breeding population is considered to be very low and the effects would be not significant with no adverse significant effect on the favourable conservation status of hen harrier.

Potential Collision with Operational Turbines

8.20.16 As detailed within **Appendix 8E**, the CRM (**Appendix 8F**) calculated an annual CRM of 0.025 (which included all flights from VP surveys within CRZ at PCH). Therefore it is anticipated that there will be no potential for significant effects on the NHZ population and potential collision with operational turbines was scoped out of any further assessment.

Operational displacement leading to barrier effects

8.20.17 It is anticipated that operational displacement effects to roosting hen harrier within the ZoI would be similar to those experienced by breeding hen harrier. When roosting hen harrier are as sensitive during the non-breeding season as when nesting during the breeding season. On this basis, there is no adverse significant effect on the species conservation status.

8.21 Red-throated Diver: Breeding

Baseline Conditions

Desk Study

8.21.1 NHZ 3 supports approximately 317 pairs (*Wilson et al. 2015*), approximately 25 % of the national population.

8.21.2 Refer to **Section 8.14** for further information on status and data from the desk study.

Field Surveys

8.21.3 Refer to **Section 8.14** for further information on status and data from the field surveys.

Future baseline

8.21.4 Refer to **Section 8.14** for further information.

Predicted Effects and their Significance

Construction and Decommissioning Disturbance

8.21.5 In terms of construction and decommissioning disturbance, two breeding pairs of red-throated diver were within the ZoI (177m and 276m respectively from the nearest point of construction activity). This is equivalent to 0.63% of the NHZ population.

8.21.6 Construction and decommissioning related disturbance/displacement effects to red-throated diver within the ZoI would be temporary and sporadic and in light of the embedded measures outlined in **Table 8.10** impact magnitude would be low.

8.21.7 Red throated diver foraging and breeding habitat is not considered to be a limiting factor within Lewis and there is extensive availability of similar habitat within NHZ 3 that will remain undisturbed during construction and decommissioning. Given the temporary nature of the construction works, the magnitude of change to the NHZ 3 red-throated diver population is considered to be very low. Therefore, the effects would be not significant and there is no adverse significant effect on the favourable conservation status of red-throated diver.

Operational Disturbance

8.21.8 Disturbance effects during the operational phase are generally considered to be less than that experienced during the construction phase. In light of the embedded measures outlined in **Table 8.10**, operational related disturbance/displacement effects to breeding red-throated diver within the ZoI are considered to be of very low magnitude. Therefore the effects would be not significant and there is no adverse significant effect on the favourable conservation status of red-throated diver.

Operational Displacement Leading to Barrier Effects

8.21.9 It is anticipated that operational displacement effects to the NHZ population of red-throated diver within the ZoI would be similar to those experienced by the SPA population, albeit at a lower magnitude given the population is much larger (317 pairs as opposed to 80 pairs associated with the SPA).

8.21.10 The wind turbines within the Development Site are widely spaced and two flight corridors have been incorporated into the design of the Proposed Development as noted previously suggesting that any impediment would be minor. In addition, red-throated divers have been noted flying through the Arnish Wind Farm (observed during the surveys reported on for the Stornoway Wind Farm 2012 application) and the Burgar Hill wind farm, Orkney (Viking Wind Farm ES 2009).

8.21.11 As there are corridors within the final layout, and the turbines are widely spaced, the magnitude of change in respect of potential barrier effects on the NHZ population of red-throated diver will be of very low magnitude and effects would be not significant. There would therefore be no adverse significant effect on the favourable conservation status of red-throated diver.

8.22 White-tailed Eagle: Breeding

Baseline Conditions

Desk Study

8.22.1 White-tailed eagle is listed on Annex I of the Birds Directive, Schedules 1, 1A and A1 of the Wildlife & Countryside Act 1981 (as amended) and the Scottish Biodiversity List. This species is red listed on Birds of Conservation Concern 4 (*Eaton et al. 2015*).

8.22.2 Following the successful re-introduction of white-tailed eagle to Scotland, this species has re-colonised much of the Western Isles and is now regularly seen on the Isle of Lewis. Furthermore, a recently published modelling study commissioned by SNH suggests that this population will continue to expand in range and numbers for the foreseeable future (*Sansom et al. 2016*),

8.22.3 The Scottish population was estimated to be 82 pairs (*Wilson et al. 2015*), with an estimated 23 pairs in NHZ 3.

8.22.4 In 2017, at least 122 pairs were confirmed to be occupying territories in Scotland and of these, 87 laid eggs with 65 pairs successfully fledging 86 young (*Challis et al. 2018b*), representing a four-fold increase in occupied territories in 13 years (32 occupied territories in 2004 – Scottish Raptor Monitoring Scheme Report 2004). The Western Isles supported 33 pairs, 23 of which were on the Isle of Lewis and Harris (full survey coverage – i.e. all known territories) and 19 of which laid eggs. 16 of these pairs fledged 20 young between them (*Challis et al. 2018b*).

8.22.5 A pair of white-tailed eagle nest within approximately 5km from the closest proposed infrastructure. The territory was established in 2013 by a sub-adult female and an adult male, utilising an old golden eagle nest. The first breeding attempt was made in 2014, at which two young were fledged. In 2015 the breeding attempt failed at the egg or early chick stage. The outcome was unknown in 2016, whilst two chicks fledged in 2017. This nest failed in 2018.

Field Surveys

Flight Activity Surveys 2018

8.22.6 White-tailed eagle flight activity followed no obvious pattern, although flights were predominantly recorded in the central and southern survey areas. **Table 8.19** presents a summary of flight activity recorded within the CRZ during VP and focal watch surveys.

Table 8.19 White-tailed Eagle: VP Flight Activity Data

	Season	Total Number Flights	Total Seconds Below PCH	Total Seconds at PCH	Total Seconds Above PCH
VP	Breeding (February – August)	19	342	1,675	1,740

Future Baseline

8.22.7 In the absence of development, white-tailed eagle are likely to continue to expand from their present population levels on Lewis until they reach the island's carrying capacity (Sansom, 2016; Natural Research, 2019).

Predicted Effects and their Significance

Potential Collision with Operational Turbines

8.22.8 The level of flight activity recorded from VP surveys (**Table 8.17**) was subject to CRM and this resulted in a theoretical collision risk of 0.370 fatalities per year (**Appendix 8F – CRM**), equating to 0.8 % of the increasing NHZ population. Impact magnitude is therefore considered to be low and the effects would be not significant. Therefore, there is no adverse significant effect on the favourable conservation status of white-tailed eagle.

8.23 White-tailed Eagle: Non-breeding

Baseline Conditions

Desk Study

8.23.1 As white-tailed eagle occupy their territories throughout the year their breeding status described in **Section 8.23** can also be applied to territorial pairs during the non-breeding season.

Field Surveys

Flight Activity Surveys 2017-18

8.23.2 White-tailed eagle flight activity followed no obvious pattern. **Table 8.20** presents a summary of flight activity recorded within the CRZ during VP surveys.

Table 8.20 White-tailed Eagle: VP Flight Activity Data

	Season	Total Number Flights	Total Seconds Below PCH	Total Seconds at PCH	Total Seconds Above PCH
VP	Non-breeding (October – January)	19	342	1,675	1,740

Future baseline

8.23.3 Refer to **Section 8.23.7** for further information.

Predicted Effects and their Significance

Potential Collision with Operational Turbines

8.23.4 In terms of potential collisions with operational turbines, the levels of flight activity recorded from VP surveys (**Table 8.17)** were subject to CRM and this resulted in a theoretical collision risk of 0.236 fatalities per year (**Appendix 8F**), equating to 0.51% of the increasing NHZ population. Impact magnitude with respect to collision is considered to be low.

8.23.5 Therefore the effects would be not significant and there would be no adverse significant effect on the favourable conservation status of white-tailed eagle.

8.24 Whooper Swan: Breeding

Baseline Conditions

Desk Study

8.24.1 Whooper swan is listed on Annex I of the Birds Directive, Schedule 1 of the Wildlife & Countryside Act 1981 (as amended) and appears on the Scottish Biodiversity List. It is an Amber listed BoCC due to its rarity as a breeding species (*Eaton et al 2015*).

8.24.2 Whooper swan is a regular winter visitor to the UK from its breeding rounds in the Arctic Circle, with only a small number of sporadic breeding records in the UK recorded each year. The Scottish breeding population was estimated to be between 3-7 pairs (*Forester et al. 2007*).

Field Surveys

Breeding Bird Surveys 2018

8.24.3 A single confirmed breeding attempt was confirmed within the Development Site in 2018 (**Appendix 8D**).

Flight Activity Surveys 2018

8.24.4 A single flight outside of PCH was recorded within the CRZ from VP surveys during the breeding season (April – August 2018) (**Appendix 8F**).

Future Baseline

8.24.5 The whooper swan is long-lived, monogamous and shows delayed maturity. Only a small proportion of the population breed in any year (Haapanen et al 1973 b). During a 12-13 year study of breeding whooper swan in their traditional nesting grounds in northern Iceland, Einersson and Rees (2002) identified that there was wide scale variation in inter-year occupancy of territories, and that 35% of pairs were only present for one year over a 12-13 year period. Given the rare and sporadic nature of breeding attempts recorded in the UK, whooper swan are not likely to maintain their present breeding population levels within the study area.

Predicted Effects and their Significance

Construction and Decommissioning Disturbance

8.24.6 One breeding pair of whooper swan falls within the ZoI (55m from the nearest point of construction activity). This is equivalent to between 14 - 33% of the National population.

8.24.7 Construction and decommissioning related disturbance/displacement effects to whooper swan within the ZoI would be temporary and sporadic and in light of the embedded measures outlined in **Table 8.10**, impact magnitude would be low.

8.24.8 The sporadic nature of breeding attempts (no previous breeding records from the 2010/11 and 2015/16 surveys) indicates that there may be no pairs present during the construction phase. Additionally, the extent of the available habitat within the Isle of Lewis that will remain undisturbed during construction and decommissioning would offer any potential prospective breeding pairs alternative habitats.

8.24.9 Therefore the magnitude of change to the national whooper swan breeding population is considered to be low, and the effects would be not significant, with no adverse significant effect on its favourable conservation status.

Operational Disturbance

8.24.10 Disturbance effects during the operational phase are generally considered to be less than that experienced during the construction phase. In light of the embedded measures outlined in **Table 8.10**, operational related disturbance/displacement effects to breeding whooper swan within the ZoI are considered to be low magnitude.

8.24.11 Therefore, the magnitude of change to the national whooper swan breeding population is considered to be very low, and effects would be not significant, with no adverse significant effect on the favourable conservation status of whooper swan.

8.25 Assessment Summary

8.25.1 A summary of the assessment is provided in **Table 8.21.** This deals in an integrated way, with the effects of all phases of the Proposed Development. Potential effects are considered together as the assessment focuses on the favourable conservation status of each feature and as such, is assessed throughout the lifespan of the Proposed Development. Often, changes to a feature would occur during several stages of the Proposed Development and the resultant effect may reverse during different phases. For example, during construction a local population may decline as a result of disturbance, however, this effect may be reversed during operation.

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Table 8.21 Summary of Significance of Adverse Effects

Ecological Feature	Summary of Predicted Effects	Importance of Ecological Feature[15]	Magnitude of Change[16]	Significance[17]	Summary Rationale
Lewis Peatlands SPA – black throated diver	*Operation: Barrier to flights leading to displacement*	International	Low	Not significant	Limited levels of flight activity recorded were recorded. Sensitive design layout and the implementation of a Bird Protection Plan and other embedded measures during operation would ensure that the magnitude of any disturbance/displacement effects was low and the resultant effect on SPA site's integrity would be not significant.
Lewis Peatlands SPA – golden eagle	*Potential collision with operational turbines*	International	Low	Not significant	The low levels of flight activity resulted in a combined theoretical annual collision risk of 0.16, which equates to 1.6% of the SPA population. A simple population model indicates that this level of additional mortality would not lead to a reduction in the population of the SPA over the lifetime of the Proposed Development. On this basis, there is no adverse significant effect on the site's integrity.
Lewis Peatlands SPA - greenshank	*Construction and decommissioning disturbance*	International	Very low	Not significant	Three pairs of breeding greenshank within the SPA fall within the ZoI, equivalent to 2.1% of the SPA population. However, due to the extent of available habitat within the SPA that would remain undisturbed during construction and decommissioning, the implementation of a Bird Protection Plan and other embedded measures and the temporary nature of the construction works, the magnitude of change to the Lewis Peatlands SPA greenshank population is considered to be very low, and the resultant effect on the site's integrity is not significant.

[15] The importance of the feature is defined as per **Table 8.9, Section 8.8**, using the criteria set out in **Table 8.8** and method in **Section 8.8**.
[16] The magnitude of change on a receptor resulting from activities relating to the development is defined using the criteria set out in **Section 8.10, Table 8.11** above and is defined as neutral, very low, low, medium, and high.
[17] The significance of the environmental effects are either significant or not significant subject to the evaluation methodology outlined in **Section 8.10**.

Ecological Feature	Summary of Predicted Effects	Importance of Ecological Feature[15]	Magnitude of Change[16]	Significance[17]	Summary Rationale
Lewis Peatlands SPA – red-throated diver	*Construction and decommissioning disturbance*	International	Very low	Not significant	One pair of red-throated diver within the SPA falls within the ZoI, being equivalent to 1.2% of the SPA population. However, due to the extent of available habitat within the SPA that would remain undisturbed during construction and decommissioning, the implementation of a Bird Protection Plan and other embedded measures and the temporary nature of the construction works, the magnitude of change to the Lewis Peatlands SPA red-throated diver population is considered to be very low, and the resultant effect on the site's integrity is not significant.
	Operation: Barrier to flights leading to displacement	International	Low	not significant	The wind turbines within the Development Site are widely spaced and there are two corridors built into the design suggesting that any impediment will be minor. In addition, red-throated divers have been noted flying through the Arnish Wind Farm (observed during the surveys reported on for Consented Development) and the Burgar Hill Wind Farm, Orkney (Viking Wind Farm ES 2009). As there are flight corridors within the final design, and the turbines are widely spaced, the magnitude of change in respect of potential barrier effects would be no more than low and therefore not significant. On this basis, the resultant effect on the site's integrity is not significant.
	Potential collision with operational turbines	International	Low	not significant	The levels of flight activity recorded resulted in a theoretical annual collision rate of 0.43, which equates to 0.27% of the SPA population. A simple population model was created, which indicates that this level of additional mortality would still allow the Lewis Peatlands SPA red throated diver population to increase over the lifetime of the wind farm. On this basis, the resultant effect on the site's integrity is not significant.
Lewis Peatlands Ramsar – black-throated diver	*Operation: Barrier to flights leading to displacement*	International	Low	not significant	The assessment for the Ramsar black-throated diver population is considered to be consistent with that carried out for the SPA population, given that the site boundaries are the same. On this basis, the resultant effect on the site's integrity is not significant.

Ecological Feature	Summary of Predicted Effects	Importance of Ecological Feature[15]	Magnitude of Change[16]	Significance[17]	Summary Rationale
Lewis Peatlands Ramsar – greenshank	*Construction and decommissioning disturbance*	International	Low	not significant	The assessment for the Ramsar greenshank population is considered to be consistent with that carried out for the SPA population, given that the site boundaries are the same. Therefore, the resultant effect on the site's integrity is not significant
Lewis Peatlands Ramsar – red-throated diver	*Construction and decommissioning disturbance*	International	Very low	not significant	The assessment for the Ramsar red-throated diver population is considered to be consistent with that carried out for the SPA population, given that the site boundaries are the same. Therefore, the resultant effect on the Ramsar site's integrity is not significant
	Operational displacement leading to barrier effects	International	Low	not significant	The assessment for the Ramsar red-throated diver population is considered to be consistent with that carried out for the SPA population, given that the site boundaries are the same. Therefore, the resultant effect on the Ramsar site's integrity is not significant
	Potential collision with operational turbines	International	Low	not significant	The assessment for the Ramsar red-throated diver population is considered to be consistent with that carried out for the SPA population, given that the site boundaries are the same. Therefore, the resultant effect on the Ramsar site's integrity is not significant
Black-throated diver: breeding	*Construction and decommissioning disturbance*	Regional	Very low	not significant	One breeding pair of black-throated diver falls within the ZoI and this is equivalent to 2.9% of the NHZ population. However, due to the extent of available habitat within the NHZ that will remain undisturbed during construction and decommissioning, the implementation of a Bird Protection Plan and other embedded measures and the temporary nature of the construction works, the magnitude of change to the NHZ black-throated diver population is considered to be very low, and the resultant effect on the species favourable conservation status is not significant.

Ecological Feature	Summary of Predicted Effects	Importance of Ecological Feature[15]	Magnitude of Change[16]	Significance[17]	Summary Rationale
	Operation: Barrier to flights leading to displacement	Regional	Very Low	not significant	The wind turbines within the Development Site are widely spaced and there are two corridors built into the design suggesting that any impediment will be minor. This would ensure that the magnitude of any displacement effects is very low and the resultant effect on the species' favourable conservation status in the NHZ would be not significant.
Common tern: breeding	*Operation: Barrier to flights leading to displacement*	Regional	Low	not significant	The wind turbines within the Development Site are widely spaced and there is a corridor along the River Creed that the breeding tern colony uses as a commuting route to the coastal feeding areas. The resultant effect on the species' favourable conservation status would be not significant.
	Potential collision with operational turbines	Regional	Very Low	not significant	The levels of flight activity recorded from VP surveys resulted in a theoretical annual collision rate of 0.17 and this equates to 0.02% of the NHZ population. The resultant effect on the species' favourable conservation status would be not significant.
Hen harrier: breeding	*Construction and decommissioning disturbance*	Regional	Low	not significant	Three breeding pairs or 6.25% of the NHZ population may be affected. However, due to the implementation of a Bird Protection Plan and other embedded measures and the temporary nature of the construction works, the magnitude of change to the NHZ hen harrier population is considered to be low, and the resultant effect on the species conservation status is not significant.
	Operational disturbance	Regional	Very Low	not significant	Due to the implementation of a Bird Protection Plan, other embedded measures and the evidence that suggests hen harrier will nest in close proximity to wind turbines, the magnitude of change to the NHZ hen harrier population is considered to be very low, and the resultant effect on the species favourable conservation status is not significant.
	Operation: Barrier to flights leading to displacement	Regional	Low	not significant	Evidence suggests that wind turbines do not act as a barrier to breeding hen harrier, with any displacement, which appears to be mainly foraging flights rather than direct flights, being considered to be small scale. The resultant effect on the species' favourable conservation status would be not significant.

Ecological Feature	Summary of Predicted Effects	Importance of Ecological Feature[15]	Magnitude of Change[16]	Significance[17]	Summary Rationale
Hen harrier: non-breeding	*Construction and decommissioning disturbance*	Regional	Very low	not significant	Three pairs, or 0.57% of the Scottish population would be affected. However, due to the implementation of a Bird Protection Plan and other embedded measures and the temporary nature of the construction works, the magnitude of change to the NHZ hen harrier non-breeding population is considered to be very low, and the resultant effect on the species favourable conservation status is not significant.
	Operational disturbance	Regional	Very low	not significant	Due to the implementation of a Bird Protection Plan and other embedded measures, the magnitude of change to the NHZ non-breeding hen harrier is considered to be very low, and the resultant effect on the species favourable conservation status is not significant.
	Operation: Barrier to flights leading to displacement	Regional	Very low	not significant	It is anticipated that operational displacement effects to non-breeding hen harrier within the ZoI would be similar to those experienced by breeding hen harrier. The resultant effect on the species' favourable conservation status would be not significant.
Red-throated diver: breeding	*Construction and decommissioning disturbance*	Regional	Very Low	not significant	Two pairs or 0.63% of the NHZ population may be affected. However, due to the extent of available habitat within the NHZ that will remain undisturbed during construction and decommissioning, the implementation of a Bird Protection Plan and other embedded measures and the temporary nature of the construction works, the magnitude of change to the NHZ red-throated diver population is considered to be very low, and the resultant effect on the species favourable conservation status is not significant.
	Operational disturbance	Regional	Very Low	not significant	Due to the implementation of a Bird Protection Plan and other embedded measures, the magnitude of change to the NHZ breeding red-throated diver population is considered to be very low, and the resultant effect on the species favourable conservation status is not significant.

Ecological Feature	Summary of Predicted Effects	Importance of Ecological Feature[15]	Magnitude of Change[16]	Significance[17]	Summary Rationale
	Operation: Barrier to flights leading to displacement	Regional	Very Low	not significant	It is anticipated that operational displacement effects to the NHZ population of red-throated diver within the ZoI would be similar to those experienced by the SPA population, albeit at a lower magnitude given the population is much larger (317 pairs as opposed to 80 pairs). The resultant effect on the species' favourable conservation status would be not significant.
White-tailed eagle: breeding	*Potential collision with operational turbines*	Regional	Low	not significant	The levels of flight activity recorded from VP surveys resulted in a theoretical annual collision rate of 0.37 and this equates to 0.8% of the NHZ population. The resultant effect on the species' favourable conservation status would be not significant.
White-tailed eagle: non-breeding	*Potential collision with operational turbines*	Regional	Low	not significant	The levels of flight activity recorded from VP surveys resulted in a theoretical annual collision rate of 0.24 and this equates to 0.51% of the NHZ population. The resultant effect on the species' favourable conservation status would be not significant.
Whooper swan	*Construction and decommissioning disturbance*	National	Low	not significant	One breeding pair of whooper swan falls within the ZoI and this is equivalent to between 14 - 33% of the national population. Construction and decommissioning related disturbance/displacement effects to whooper swan within the ZoI would be temporary and sporadic and in light of the embedded measures, would be of low magnitude. Furthermore the sporadic nature of breeding attempts indicates that there may be no pairs present during the construction phase. Additionally, the extent of available habitat within the Isle of Lewis that will remain undisturbed during construction and decommissioning would offer any potential prospective breeding pairs alternative habitats. The magnitude of change to the national whooper swan breeding population is therefore considered to be low, and the resultant effect on the species favourable conservation status is not significant.

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Ecological Feature	Summary of Predicted Effects	Importance of Ecological Feature[15]	Magnitude of Change[16]	Significance[17]	Summary Rationale
	Operational disturbance	National	Very low	not significant	Disturbance effects during the operational phase are generally considered to be less than that experienced during the construction phase. In light of the embedded measures, operational related disturbance/displacement effects to breeding whooper swan within the ZoI are considered to be of very low magnitude. Therefore the resultant effect on the species favourable conservation status is not significant.

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8.26 Assessment of Cumulative Effects

8.26.1 Significant effects may not occur when considering the Proposed Development in isolation, but in combination with other developments, cumulative effects may be significant. The context in which cumulative effects are considered depends upon the ecology of the species or habitat in question. The need to consider cumulative effects is a requirement of the EIA process, as specified by the EIA Regulations.

8.26.2 Specific guidance has also been provided for assessment of cumulative impacts of onshore wind farms on bird populations (SNH 2018). Projects to be included in such an assessment must include existing projects as well as those consented but not yet built.

8.26.3 In order to undertake a cumulative impact assessment, it is necessary to define:

- The ornithological features affected by the Proposed Development that may be subject to significant cumulative effects in combination with other projects; and
- The relevant projects for which cumulative effects must be considered.

8.26.4 Upon defining these, a cumulative impact assessment is undertaken by drawing on the assessment of effects for ornithological features affected by the Proposed Development that are also considered in the EIA of other projects. This cumulative assessment considers all wind farms on the Western Isles that are operational and consented but not yet built.

8.26.5 The purpose of the cumulative impact assessment is to determine whether effects are likely to affect the Favourable Conservation Status of an ornithological feature. Where the species is associated with an SPA or other designated site, effects are assessed in context with this population or area. Where species are not associated with an SPA, effects are assessed in a regional context, this being NHZ 3 in the case of the Proposed Development.

8.26.6 The only effects with potential for cumulative impacts were those associated with flight activity and corresponding risk of collisions with turbines.

8.26.7 Following the approach previously agreed with SNH for the Consented Development, the receptors taken forward for cumulative assessment are Lewis Peatlands SPA red-throated diver, NHZ golden eagle and NHZ white-tailed eagle populations.

8.26.8 In respect of collision risk, the theoretical collision rates over the operational lifetime of the wind farms on the Western Isles that are operational and consented but not yet built are presented in Tables 8.22 to 8.24 for the Lewis Peatlands SPA red-throated diver (**Table 8.22**), NHZ golden eagle (**Table 8.23**) and NHZ white-tailed eagle (**Table 8.24**).

Table 8.22 25 year Cumulative Assessment: Lewis Peatlands SPA Red Throated Diver (Fatalities over 25 years)

Wind Farm Site	Turbines	Adults	Sub-adults
Stornoway	35	10.7	0.0
Muaitheabhal	33	0.0	0.0
Muaitheabhal East and South Extensions	12	0.6	0.0
Pentland Road	6	0.0	0.0
Beinn Greidaig	3	2.3	0.0

Wind Farm Site	Turbines	Adults	Sub-adults
Monan	3	0.0	0.0
Baile an Truseil	3	0.0	0.0
Arnish	3	0.0	0.0
Loch Carnan	3	2.0	0.0
Sandwick North	1	0.0	0.0
Druim Leathann	14	0.0	0.0
Total	**120**	**15.6**	**0.0**

8.26.9 The cumulative number of theoretical collisions over the course of the 25 year period for red throated divers is 15.6 individuals[18]. This level of loss is not great enough to result in the decline of the Lewis Peatlands SPA population alone (see **Appendix 8G**) and is not therefore great enough to result in a decline in the substantially larger NHZ population.

8.26.10 Therefore, the resultant adverse cumulative effect on the Lewis Peatlands SPA site's integrity or favourable conservation status of the red-throated diver NHZ population would be not significant.

Table 8.23 25 year Cumulative Assessment: NHZ Golden Eagle (Fatalities over 25 years)

Wind Farm Site	Turbines	Adults	Sub-adults
Stornoway	35	4.0	0.0
Muaitheabhal	33	4.3	2.4
Muaitheabhal East and South Extensions	12	5.8	0.1
Pentland Road	6	2.0	0.0
Beinn Greidaig	3	0.0	0.5
Monan	3	1.0	0.1
Baile an Truseil	3	0.0	0.0
Arnish	3	0.0	0.0
Loch Carnan	3	0.0	1.5
Sandwick North	1	0.1	0.0
Druim Leathann	14	0.5	0.0
Total	**120**	**17.7**	**4.6**

8.26.11 The cumulative number of theoretical collisions over the 25 year period for golden eagle is 17.7 adults and 4.6 sub-adults. Natural Research (2019) have carried out NHZ population modelling for golden eagle in the Western Isles (using a larger mortality figure of 5.7 for the Proposed

[18] If collisions were not allocated to a specific age class they have been conservatively added to the adult class.

Development) and determined that the cumulative collision rates level of loss was not great enough to result in the decline of the NHZ population.

8.26.12 Therefore, the resultant adverse cumulative effect on the favourable conservation status of the golden eagle NHZ population would be not significant.

Table 8.24 25 year Cumulative Assessment: NHZ White Tailed Eagle (Fatalities over 25 years)

Wind Farm Site	Turbines	Adults	Sub-adults
Stornoway	35	15.1	0.0
Muaitheabhal	33	2.0	0.0
Muaitheabhal East and South Extensions	12	8.0	1.3
Pentland Road	6	0.0	0.0
Beinn Greidaig	3	0.0	0.0
Monan	3	0.4	1.0
Baile an Truseil	3	0.0	0.0
Arnish	3	0.0	0.0
Loch Carnan	3	1.0	0.0
Sandwick North	1	0.0	0.0
Druim Leathann	14	0.0	0.0
Total	**120**	**26.5**	**2.3**

8.26.13 The cumulative number of collisions over the course of the 25 year period for white-tailed eagle is estimated to be 26.5 adults and 2.3 sub-adults. Natural Research (2019) carried out NHZ population modelling for white-tailed eagle in the Western Isles (using a lower mortality figure of 4.3 for the Proposed Development[19]) and determined that the cumulative collision rates of 15.57 adults and 2.3 sub-adults was not great enough to result in the decline of the NHZ population.

8.26.14 Although these cumulative collision rates are lower than those presented here, the Natural Research report found it apparent that 'no realistic level of additional wind farm mortality is likely to prevent the white-tailed eagle population from expanding quite rapidly and reaching its carrying capacity. It should also be noted that these models have isolated the Western Isles population from the rest of Scotland. In reality, there would be migrants into this population which could offset the effects of the collisions.

8.26.15 Furthermore, *Sansom et al (2016*) found that in none of their modelling scenarios did the estimated number of breeding pairs decline, and that any mortality as a result of collisions would only reduce the rate at which population growth occurs.

8.26.16 Therefore, the resultant adverse cumulative effect on the favourable conservation status of the white-tailed eagle NHZ population would be not significant.

[19] This figure was taken from the Consented Development CRM outputs, the outputs of the Proposed Development not being available at the time.

8.26.17 In summary, there are no likely significant cumulative effects in combination with the above schemes.

8.27 Consideration of Optional Additional Mitigation or Compensation

8.27.1 Consideration has been given to the possibility of removing forestry that has been planted on blanket bog and implementing habitat management measures such as ditch blocking which would raise the water table and restore hydrological function for the benefit of the mire communities. The trees that have been planted within the Development Site are generally in poor condition with many being stunted, diseased or dead. However, the bird surveys described in this Chapter have found that hen harrier preferentially use the forested areas and removal of trees for the benefit of blanket bog may therefore have a detrimental effect on this recently established population.

8.27.2 Blanket bog habitats elsewhere within the Development Site consist of a range of mire communities which are in good condition and peat is likely to be actively forming throughout, probably even within areas of old peat cuttings. As a result, it is considered that undertaking habitat management within the Development Site to compensate the loss of bog habitats is not feasible; with off-site habitat management considered more likely to result in a better overall outcome from a nature conservation perspective.

8.27.3 **Chapter 9 Appendix 9I** - **Outline Habitat Management Plan** sets out criteria for identifying and delivering compensatory blanket bog habitat management offsite. The OHMP also sets out proposals for small-scale native tree planting in appropriate locations within the Development Site and criteria for identifying and managing rush pasture and woodland habitats offsite for the benefit of hen harrier.

8.27.4 All habitat restoration proposals would be developed in consultation with SNH.

8.28 Conclusions of Significance Evaluation

8.28.1 An assessment has been made of the likely effects of the Proposed Development during the construction, operation and decommissioning stages. Some adverse effects are predicted for all ecological features scoped into this assessment, but these are all considered to be not significant in terms of the EIA Regulations.

8.28.2 It is concluded that provided good practice is followed to avoid disturbance to breeding birds, including the use of exclusion zones during construction and avoiding damage or destruction of occupied nests, significant effects on any ecological feature are unlikely.

8.28.3 A Habitat Management Plan would include measures aimed at supporting the recently established hen harrier breeding population and the restoration of peatland habitats offsite that will have an overall positive effect on moorland birds, including waders and raptors associated with the adjacent Lewis Peatlands SPA.

8.28.4 Climate change is widely accepted as the cause of some adverse ecological events and predictions indicate that declines will occur in many habitat types and ecological taxa. It is also important in the decision-making process to consider the positive contribution that the Proposed Development would have in tackling the issue of climate change.

8.29 Implementation of Environmental Measures

8.29.1 **Table 8.25** describes the ornithological measures embedded within the Proposed Development and the mechanism by which they would be implemented and who is responsible for their implementation.

Table 8.25 Summary of Environmental Measures Relevant to Biodiversity (Including Ornithology)

Environmental Measure	Responsibility for Implementation	Compliance Mechanism
CONSTRUCTION		
Preparation of Construction Environmental Management Plan (CEMP)	Developer	Planning condition
Preparation of Species Protection Plans (including bird protection plan)	Developer	Planning condition
Tool box talks	Construction Manager and ECoW.	Set out in a planning condition requiring a CEMP
Pre-construction surveys to be set out in an Ornithological Monitoring Plan and implemented.	Developer/Contractor	Planning condition
OPERATION PHASE		
All maintenance working areas would be clearly defined and checked for breeding birds before works undertaken.	Developer and ECoW	Planning condition
Monitoring of effects on ornithology through an Ornithological Monitoring Plan.	Developer	Planning condition
DECOMMISSIONING		
Preparation of a Restoration and Decommissioning Plan.	Developer	Planning condition
Monitoring of effects on ornithology through an Ornithological Monitoring Plan.	Developer/Contractor	Planning condition

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9. Ecology

Non-Technical Summary

The layout of the turbines, road network and associated infrastructure has evolved through the iterative design process, taking consideration of environmental constraints to avoid potentially significant adverse effects on ecological features. Specifically, the layout was designed to avoid otter resting sites and path networks, the most sensitive areas of blanket bog habitat and rare plant species.

Similarly the iterative design process has incorporated embedded measures to minimise or 'design-out' the risk of significant effects on freshwater ecology: numbers of watercourse crossings have been restricted to a practical minimum; watercourse crossings have been designed in accordance with good practice, maintaining connectivity of watercourse habitat and avoiding impeding fish passage/migration; a minimum stand-off ('buffer') of 50m between wind farm infrastructure (permanent and temporary) and watercourses / waterbodies (with the exception of watercourse crossings) has been incorporated into the design; and the timing of in-channel works would avoid sensitive life stages of fish.

Working practices to minimise effects on terrestrial and freshwater ecology during construction would be set out in a Construction Environmental Management Plan and implemented under the direction/supervision of an Environmental Clerk of Works. A full Habitat Management Plan would be developed following the principles presented in the Outline Habitat Management Plan which accompanies the EIA Report.

9.1 Introduction

9.1.1 This chapter of the EIA Report assesses the likely significant effects[1] of the Proposed Development with respect to ecology. The chapter should be read in conjunction with the development description provided in **Chapter 4: Description of the Proposed Development** and with respect to relevant parts of other chapters, including **Chapter 8: Ornithology** and **Chapter 11: Geology, Hydrology and Hydrogeology**, where common receptors have been considered and where there is an overlap or relationship between the assessment of effects. In the Ecology Chapter, receptors are referred to as ecological features, to accord with the Chartered Institute of Ecology and Environmental Management (CIEEM 2018) "*Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine*". The term ecological feature is defined in the guidance as pertaining to habitats, species and ecosystems.

9.1.1 Potential effects on European sites[2] are considered with regard to the Conservation of Habitats and Species Regulations 2017 within the Habitats Regulations Appraisal (HRA). A HRA Screening Report/HRA report is provided in **Appendix 8H: Habitats Regulations Appraisal**.

[1] In this Ecology chapter, the term "potentially significant effects" is used in the sections prior to the "scope of the assessment" (**Section 9.7**) being determined, as it accords with CIEEM guidance. The term "likely significant effects" is used once the scope of the assessment has been determined. The use of this term is not to be confused with Likely Significant Effects (LSEs) as used in the context of the Habitats Regulations Appraisal.

[2] European sites include Special Protection Areas (SPA), Special Areas of Conservation (SAC), candidate SACs (cSAC) and Sites of Community Importance (SCI); these sites are collectively referred to as Natura 2000 sites. Potential SPAs (pSPA), possible SACs (pSACs), Ramsar sites and proposed Ramsar sites should also be considered in the same manner in accordance with national planning policy.

9.2 Scope and Limitations of this Assessment

9.2.1 The results of a desk study and field surveys have been used to determine the baseline context of the Development Site. The information available provides a robust basis for undertaking an Ecological Impact Assessment (EcIA) as:

- Desk study data are available for adjacent areas and this suggests that these are not markedly different to the Development Site in respect of the potential presence of notable ecological features[3];
- Aerial imagery and observation during field survey indicates that habitats within adjacent areas are similar to those within the Development Site. It is reasonable to assume therefore that ecological features in adjacent areas that may be affected by the Proposed Development are similar to those that occur within the Development Site;
- The likelihood of potentially significant effects generally diminishes with distance from a Proposed Development, particularly where these relate to direct effects.

9.2.2 Field surveys predominantly followed the survey guidance that is widely recognised, including by Scottish Natural Heritage (SNH). Full details are provided in the accompanying survey reports, which also note where deviations occurred due to issues including adverse weather, health and safety concerns and land access (**Appendix 9B: Phase 1 Habitat and NVC Survey; Appendix 9C: Otter Survey 2018/19; and Appendix 9D: Freshwater Fish Survey**).

9.2.3 The fish surveys were undertaken in accordance with good practice (SFCC 2007). The limitations on the fish surveys are set out in **Appendix 9D.** The survey method does not provide a quantitative assessment of non-salmonid species and therefore a precautionary approach has been adopted in assessing effects on these species. Similarly, the assessment relies on two years of fish survey data, which are insufficient to inform definitive conclusions on trends in fish numbers, plus there was some, albeit limited, variation between the 2010 and 2018 survey locations. Therefore, limited emphasis is placed on any apparent variation in fish numbers between the two survey years. Water levels were high to very high at a number of survey locations, which can influence the numbers of fish caught during the survey. Similarly in the event of low or patchy fish distribution this can make it more difficult to draw conclusions on fish density. The importance of fish populations is assigned based on the populations recorded within each watercourse, over multiple survey locations and two survey years, rather than at individual survey locations in any given year. Therefore a precautionary approach is adopted in categorising the importance of fish populations and in assessing the effects of the Proposed Development on them.

9.2.4 It was not possible to find any information in the public domain relating to the Muaitheabhal (Beinn Mhor) Wind Farm, which is located approximately 16km from the Proposed Development and is considered in the cumulative section of the chapter (**Section 9.19**).

9.2.5 However, it is considered that the limitations of the survey programme do not affect the robustness of the assessment of the likely significant effects of the Proposed Development.

[3] Notable ecological features are those with conservation designations, but no legal protection.

9.3 Relevant Legislation, Planning Policy, Technical Guidance

Legislative Context

9.3.1 The legislative context of this EIA Report is set out in **Chapter 5**. The following legislation has been considered in the assessment of the effects on ecological features[4]:

- Habitats Directive (Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora) as transposed into Scots Law by the Conservation (Natural Habitats &c.) Regulations 1994 (as amended in Scotland) (the "Habitats Regulations");
- Wildlife and Countryside Act 1981 (as amended in Scotland);
- Nature Conservation (Scotland) Act 2004 (as amended);
- Water Environment and Water Services (Scotland) Act 2003 (WEWS Act);
- Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003; and
- Marine (Scotland) Act 2010.

Planning Policy Context

National Policies

9.3.2 A summary of the relevant national planning policies is given in **Table 9.1**.

Table 9.1 National Planning Policy Issues Relevant to Ecology

Policy Reference	Policy Issue
SCOTTISH PLANNING POLICY (2014)	
Valuing the Environment Subject Policy (paragraphs 193-218)	The 'Valuing the Natural Environment' subject policy within the Scottish Planning Policy (SPP) (2014) sets out detailed policy provisions relating to the protection and enhancement of different types of natural resources and natural heritage assets, as detailed below: • Natural Heritage Planning Principles (paragraph 194); • Protecting Designated Sites (paragraph 196); • Development Management Decisions (paragraphs 202-206); • Non-Native Species (paragraph 206); • Protected Species (paragraph 214); and Woodland (paragraph 216).
Protecting Designated Sites (paragraph 196)	The SPP requires designated areas and sites to be identified and appropriately protected through development plans, without the use of buffer zones (paragraph 196). Within the same paragraph the SPP states that "*the level of protection given to local designations should not be as high as that given to international or national designations*".
Development Management Decisions (paragraphs 202-206)	The SPP states that planning decisions "*should take account of potential effects on landscapes and the natural and water environment, including cumulative effects*". The SPP further states that "*planning permission should be refused where the nature or scale of proposed development would have an unacceptable impact on the natural environment*". It is noted in the same paragraph that whilst effects on statutorily protected sites will be an important consideration, this "*does not impose an automatic prohibition on development*".

[4] The Chartered Institute for Ecology and Environmental Management (CIEEM) refer to biodiversity receptors within technical guidance as ecological features.

Policy Reference	Policy Issue
Non-Native Species (paragraph 206)	The SPP states that "*where non-native species are present on site, or where planting is planned as part of a development, developers should take into account the provisions of the Wildlife and Countryside Act 1981 relating to non-native species*".
Protected Species (paragraph 214)	The SPP notes that "*the presence (or potential presence) of a legally protected species is an important consideration in decisions on planning applications. If there is evidence to suggest that a protected species is present on site or may be affected by a proposed development, steps must be taken to establish their presence. The level of protection afforded by legislation must be factored into the planning and design of the development and any impacts must be fully considered prior to the determination of the application*".
Woodland (paragraph 216)	The SPP notes that the Scottish Government's Control of Woodland Removal Policy "*includes a presumption in favour of protecting woodland. Removal should only be permitted where it would achieve significant and clearly defined additional public benefits*". The SPP also confirms that where woodland is removed in association with a proposed development, compensatory planting will generally be expected.
LOCAL PLANNING POLICY	
Outer Hebrides Local Development Plan (LDP) (2018)	The adopted Outer Hebrides LDP policies of relevance to this chapter include: • Policy EI3 Water Environment (seeks to ensure that new developments protect, and where possible deliver improvements to, water bodies (rivers, streams, lochs, groundwater, estuaries, coastal waters (to 3 nautical miles) and wetlands). • Policy EI5 Soils (seeks to ensure that developments are designed to minimise impacts on soil and unnecessary disturbance is avoided through application of sustainable management practices. Development proposals will only be approved where it has been demonstrated that unnecessary disturbance of carbon rich soils, such as peat and associated vegetation, has been avoided). • Policy NBH2 Natural Heritage (seeks to protect European, national and local conservation areas, protected species, biodiversity and geodiversity). • Policy NHB3 Trees and Woodlands (places stipulations on development proposals that require woodland removal);
BIODIVERSITY POLICY	
UK Biodiversity Action Plan (UKBAP) / UK Post-2010 Biodiversity Framework (UKBAP)	The UKBAP, produced in 1994 by the UK Government, was a national strategy for the conservation of biodiversity. The UKBAP was updated in July 2012 with a plan which covers the period 2011-2020. This framework is implemented individually by each of the four UK devolved areas. Within Scotland, the UKBAP is coordinated through the Biodiversity Action Reporting System (BARS), which is an online tool which contains a list of Scottish priority habitats and species (The Scottish Biodiversity List). All UKBAP species and habitats are listed in the SBL.
Scottish Biodiversity List (SBL)	The SBL is a list of flora, fauna and habitats considered by the Scottish Ministers to be of principal importance for biodiversity conservation and its publication was a requirement of Section 2(4) of The Nature Conservation (Scotland) Act 2004.
Western Isles Local Biodiversity Action Plan (LBAP)	The SBL is referred to instead of the LBAP as the previous version of the LBAP is no longer relevant.

Development Plan Policies

9.3.3 A summary of the relevant development planning policies is given in **Table 9.2**.

Table 9.2 Development Plan Policy Issues Considered within the Assessment of Ecology

Policy reference	Policy description
Outer Hebrides Local Development Plan Adopted Plan (2018)	
Policy NBH2: Natural Heritage	Where there is good reason to suggest that a European Protected Species (EPS)* is present on site, or may be affected by a proposed development, the Comhairle will require any such presence to be established and, if necessary, a mitigation plan provided to avoid or minimise any adverse impacts on the species, prior to determining the application. Planning permission will not be granted for development that would be likely to have an adverse effect on an EPS unless the Comhairle is satisfied that: a) There is no satisfactory alternative; and b) The development is required for preserving public health or public safety or for other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment; and c) the development will not be detrimental to the maintenance of the population of an EPS at a favourable conservation status in its natural range. Development proposals should avoid having a significant adverse effect on, and where possible should enhance, biodiversity and ecological interests of the site. Developers are encouraged to assess the impacts of their proposed development on UK Biodiversity Action Plan (BAP) priority species and habitats and Local BAP habitats and species. Developers should refer to the Scottish Biodiversity List for a full list of animals, plants and habitats considered to be of principal importance for biodiversity conservation in Scotland (this list includes all UK priority species).
Policy NBH3: Trees and Woodland	There is a strong presumption against the removal of established individual trees and woodland of mixed native species which have a landscape and amenity value and/or contribute to nature conservation, unless removal would achieve significant additional economic, environmental or social benefits. In order to minimise any adverse impacts on amenity, biodiversity or landscape value, developers will be required to incorporate existing trees and woodland into developments through sensitive siting and design. Where loss is unavoidable, appropriate replacement planting should be sought through the use of planning conditions or through a legal agreement if appropriate. The Comhairle will seek opportunities to create new woodland and plant native trees in association with new development. The Comhairle will support proposals associated with the restoration and enhancement of the native woodland resource as identified in the Western Isles Native Woodland Restoration Survey Report.
Outer Hebrides Local Development Plan Supplementary Guidance: Wind Energy Development	
Natural Heritage	All provisions of Policy NBH2 Natural Heritage and Policy NBH3 Trees and Woodland of the Outer Hebrides Local Development Plan apply in assessing the potential impact of wind energy developments on natural heritage. In addition, the following policy provisions apply to wind farm proposals: • International and national sites are identified as areas of constraint; in these areas wind farms may be appropriate in some circumstances but 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; • In relation to other nationally important environmental interests, the policy principles relating to 'carbon rich soils, deep peat and priority peat-land' are outlined in Policy ' Soil Resources' and for 'areas of wild land' as shown on 2014 SNH Map of Wild Land Areas in Policy 'Landscape and Visual Impact'. It is important to assess whether there are processes or pathways by which a proposal lying outwith a designated site may still influence the sites' 'qualifying interests'. For proposals within such 'supporting habitat', further assessment may be required to establish impacts on the integrity of sites.

Technical Guidance

9.3.4 Publications that provide guidance that is relevant to the assessment of potentially significant effects on ecology are listed below:

- Chartered Institute of Ecology and Environmental Management (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Chartered Institute of Ecology and Environmental Management, Winchester;
- SEPA (2010a) Land use planning system SEPA guidance note 4: Planning Guidance on wind farm developments (including guidelines for groundwater unit staff and ecologists when assessing the impacts of wind farms on groundwater and associated receptors);
- SNH (2010) Floating Roads on Peat;
- SEPA (2008) Engineering in the water environment good practice guide: construction of river crossings;
- Forestry Commission (2003) Forests and Water Guidelines fourth edition;
- Anderson, R. (2001) Deforesting and restoring peat bogs: a review. Forestry Commission Research Paper/Report;
- Anderson, R. (2010) Restoring afforested peat bogs: results of current research. Forestry Commission Research Note http://www.forestry.gov.uk/pdf/fcrn006.pdf/$FILE/fcrn006.pdf;
- CIRIA C648 (2006), Control of water pollution from linear construction projects;
- SNH (2013) Constructed tracks in the Scottish Uplands. Updated September 2015;
- Scottish Renewables, SNH, SEPA, Forestry Commission Scotland and Historic Environment Scotland (2015). Good Practice during Wind Farm Construction (3rd Edition);
- Welstead, J., Hirst, R., Keogh, D., Robb G. and Bainsfair, R. (2013). Research and guidance on restoration and decommissioning of onshore wind farms. Scottish Natural Heritage Commissioned Report No. 591; and
- Godfrey (2005) Site Condition Monitoring of Atlantic Salmon SACs. SFCC to Scottish Natural Heritage, Contract F02AC608.

9.3.5 Technical guidance used to define the survey methods and inform this assessment are referenced in **Appendix 9B: Phase 1 Habitat and NVC Survey; Appendix 9C: Otter Survey 2018/19; and Appendix 9D: Freshwater Fish Survey.**

9.4 Data Gathering Methodology

Study Area

9.4.1 The "Study Area" encompasses the area over which all desk-based and field data were gathered to inform the assessment presented in this chapter. Due to the presence of multiple ecological features and many potential effects, the level and type of data collection varies across the study area. The Study Area comprises:

- The Development Site (as defined in Chapter 4: Project Description and Figures 1.1, 1.2 and 4.1);
- The desk study area for European sites;
- The desk study area for legally protected and notable ecological features; and

- The field survey areas.

9.4.2 The extent of the desk study area(s) and field survey area (see **Table 9.3**) were determined based on best practice guidance and a high-level overview of the types of ecological features present, and the potential effects that could occur (see Figure 9A.1 Biodiversity Study Area in **Appendix 9A**). The Study Area was defined on a precautionary basis to ensure that, as a minimum, the Zone of Influence[5] (ZoI) relevant to all ecological features (see **Table 9.8** and **Section 9.7**) were covered during baseline data collection activities.

9.4.3 As the design of the Proposed Development has evolved iteratively, the Study Area, and its constituent parts, has been regularly reviewed to ensure that its extent was adequate to enable the assessment of all potentially significant effects of the ecological features identified. Changes to the initial developable area, or the precise nature of the development, have been reviewed in light of the ecological features present (this being informed by the data gathering exercise) and the potential effects that could occur. At each stage of design evolution, the extent of the Study Area, including all of its components, was tested using the methodology described in **Section 9.7** to ensure adequate information was available on which to base an assessment.

Desk Study

9.4.4 A desk-based data-gathering exercise was undertaken to obtain existing information relating to relevant ecological features, these being: statutory and non-statutory biodiversity sites; habitats and species of principal importance[6]; legally protected and controlled species; and other conservation notable species that have been recorded over the previous 10 years (i.e. since 2009). **Table 9.3** lists the data compiled within the desk Study Area (which is the Development Site and the additional areas of search beyond and is shown in **Appendix 9A Ecological Desk Study** at Figure 9A.1 Study Area).

9.4.5 Where appropriate, data were drawn from existing ecological records and site information obtained through field surveys conducted in 2010/ 11 as part of the 2012 Stornoway Wind Farm application. Field data collected during this period that is pertinent to this assessment included Phase 1 Habitat and National Vegetation Classification (NVC) Surveys (See **Appendix 9B**); otter surveys (See **Appendix 9C)**; and freshwater fish surveys (**Appendix 9D**). **Section 9.4.7 to 9.4.13** describe survey work that was carried out in 2018.

Table 9.3 Information Relevant to the Desk Study

Ecological Feature	Example/Description	Study Area[7]
Statutory sites designated under International conventions or European legislation	Wetlands of International Importance (also known as Ramsar sites), Special Areas of Conservation (SACs) and Special Protection Areas (SPAs)	The Development Site and within 20km of it.
Statutory sites designated under national legislation	Sites of Special Scientific Interest (SSSIs), National Nature Reserves (NNRs) and Local Nature Reserves (LNRs)	The Development Site and within 2km of it.
Locally designated sites	Often termed as Local Wildlife Sites (LWS), County Wildlife Sites (CWS), Sites of Interest for Nature Conservation (SINC)	The Development Site and within 2km of it.

[5] The Zone of Influence (ZoI) in this context is the area over which an individual ecological feature may be subject to a potentially significant effect resulting from changes in the baseline environment due to the Proposed Development.
[6] Scottish Biodiversity List features.
[7] Justification for the extent of the desk study areas is provided in Appendix 9A.

Ecological Feature	Example/Description	Study Area[7]
Scottish Biodiversity List; Red listed species[8]; and Legally protected species.	Flora, fauna and habitats of principal importance for the conservation of biodiversity in Scotland. Species recorded on The IUCN Red List of Threatened Species and/or local Red Lists for the UK or relevant sub-units (e.g. regions or counties) and legally protected habitats and species include those listed on Schedules 1, 5 and 8 of the *Wildlife and Countryside Act 1981* (as amended in Scotland), those included on Schedules 2 and 5 of the Habitats Regulations. Badgers are protected under the Protection of Badgers Act 1992.	The Development Site and within 2km of it.
Legally controlled species	Legally controlled species include those listed on Schedule 9 of the *Wildlife and Countryside Act 1981* (as amended in Scotland).	The Development Site and within 2km of it.

9.4.6 **Table 9.4** lists the organisations and other sources that have supplied data, together with the nature of the information provided.

Table 9.4 Sources of Desk Study Data

Source	Nature of information provided
SNH's interactive map facility at (https://sitelink.nature.scot/home)	Access to data and information on key protected areas across Scotland.
Scottish Environment Protection Agency (SEPA) website (www.sepa.org.uk)	Information on the classification of the ecological status of waterbodies under the Water Framework Directive (WFD) and Freshwater Fish Directive (FFD).
National Biodiversity Network (NBN) gateway's information service (http://data.nbn.org.uk)	Commercially-available records of protected and/or notable species from within the last ten years.
Forestry Commission online map (http://map.environment.scotland.gov.uk/landinformation search/lis_map.html);	Extents of woodland and forests (including ancient woodland inventory areas) and FCS approved areas for plantation.
Stornoway Wind Farm 2012 Environmental Statement (ES) Stornoway Wind Farm Variation 2016 ES	Phase 1 Habitat and National Vegetation Classification, Otter and Fish baseline surveys together with contextual material regarding the now consented wind farm. Ecology site walkover (February 2014), fisheries pre-construction baseline monitoring plan and fisheries crossing photos.
Outer Hebrides Biological Recording group	Records of protected and/or notable species within a 2km radius of the Development Site.
Findlay, M., Alexander, L. & Macleod, C. 2015. Site condition monitoring for otters (*Lutra lutra*) in 2011-12. Scottish Natural Heritage Commissioned Report No. 521.	Baseline condition status of Lewis Peatlands SAC with respect to otters.
Ellendale Environmental (2017). Habitat Assessment of Abhainn Ghridda for Freshwater Pearl Mussel. Report for Point and Sandwick Trust	Freshwater pearl mussel survey and assessment of habitat suitability at two locations on the River Creed.

[8] Red listed species for the purposes of this assessment refer to those noted using IUCN criteria as being “Near Threatened”, “Vulnerable”, “Endangered” and “Critically Endangered”, and those on present on local Red Lists in the categories "Nationally Scarce" and “Nationally Rare”.

Survey Work

Habitat Survey

9.4.7 It was agreed through the scoping exercise (**Appendix 2A and 2B**) that the comprehensive NVC survey carried out for the Stornoway Wind Farm in 2011 would be sufficient for this EcIA and no further vegetation survey was therefore carried out for the Proposed Development.

Otter Surveys

9.4.8 An otter survey following standard methods was carried out on all watercourses and waterbodies within the Study Area between 03 and 07 September 2018 and 07 and 11 January 2019 (see **Appendix 9C - Otter Survey**).

9.4.9 The survey comprised a walkover assessment of the main water features, associated banks, and up to 50m from bank tops within the Development Site and associated 200m buffer (100m buffer for proposed access tracks) (Figure 9C.1 Study Area located in **Appendix 9C**). Two surveyors worked in parallel to survey the watercourse edges/banksides of each watercourse in order to cover the area efficiently, and also to comply with health and safety requirements associated with work in/near water.

Fish Surveys

9.4.10 Electrofishing Surveys were conducted at 19 separate sites (Figure 9D located in **Appendix 9D**) covering the three river catchments that intersect the Development Site: River Laxdale (Abhainn Lacasdail), Glen River (Abhainn a' Ghlinn Mhoir) and River Creed (Abhainn Ghrioda), with the River Creed being notably larger than the other rivers, plus the River Tope, which is situated to the south of the Development Site. The surveys were undertaken during one season and were completed between the 24th and 29th September 2018. The survey sites correspond approximately with the locations of previous similar surveys in 2010, which are reported in the 2012 Stornoway Wind Farm ES. The surveys are reported in detail in a separate report (**Appendix 9D**).

9.4.11 The surveys were conducted by suitably qualified and experienced personnel in accordance with good practice. Fully quantitative methods were adopted, employing a multiple run (survey) approach at each survey location. All salmonids caught were identified (species), counted and measured (fork length). Non-salmonid species were recorded but not measured. Estimates of salmonid abundance were calculated based on the depletion in fish numbers recorded during successive survey runs at each survey location. Fish ages were derived based mainly on length, with the ages of some older fish verified by taking scale samples for inspection under a microscope.

9.4.12 Estimates of minimum fish density were calculated, separated into fry (0+ or young of the year) and parr (juveniles, typically 1 to 2 years old) for both salmon and trout, by dividing the number of fish caught by the area of habitat surveyed. Juvenile fish densities were classified according to the SFCC classification scheme - Outer Hebrides region (Godfrey 2005) and then categorised on a scale from excellent to very poor.

9.4.13 At each electrofishing site, instream habitat characteristics were also recorded in accordance with good practice (SFCC 2007), including instream cover, depths, substrates, flow types, bankside cover, bank face vegetation, overhanging boughs and canopy cover. This information was used to derive an evaluation (High, Good, Moderate or Poor) of the Fish (salmonid) Utilisation Potential and Fisheries (salmonid) Habitat Quality at each survey site, based upon professional judgement.

Freshwater Invertebrate Surveys (Including Freshwater Pearl Mussel)

9.4.14 The previous (2010/11) freshwater invertebrate surveys and freshwater pearl mussel surveys of the watercourses that cross the Development Site are detailed in the 2012 Stornoway Wind Farm ES and this information was reviewed as part of the desk study as set out above. These surveys did not record freshwater pearl mussels, recording mainly unsuitable or sub-optimal habitat for this species. Diverse assemblages of common and widespread invertebrate species that are typical of small upland watercourses in north Scotland were recorded. The baseline status of freshwater invertebrates is unlikely to have changed substantively since 2010/11 and no additional freshwater invertebrate surveys have been completed. This has been agreed with Scottish Natural Heritage (**Section 9.6**).

9.5 Overall Baseline

9.5.1 The description of the ecological features below provides a summary of the ecology baseline as determined through desk study and field survey. Further details of the desk study and field survey programme are provided in **Sections 9.10 – 9.17**, and detailed descriptions of the desk study and field survey results are provided in **Appendices 9A, 9B and 9C**.

Current Baseline

Site Context and Surrounding Habitats

9.5.2 The Development Site is located south west of Stornoway and east of the Lewis Peatlands SAC, SPA and Ramsar on land owned by the Stornoway Trust. The terrain is characterised by low lying blanket bog and moorland, with fragmented coniferous plantation forest. The Development Site is intersected by three river catchments, from north to south the catchments are - the River Laxdale (Abhainn Lacasdail), Glen River (Abhainn a' Ghlinn Mhoir) and River Creed (Abhainn Ghrioda). The River Tope (Abhainn Leireabhaigh) is situated to the south of the Development Site. The River Creed is notably larger than the other watercourses. There are also a number of freshwater lochs within the Development Site.

9.5.3 Current land management practices comprise extensive sheep grazing and small-scale (crofter) peat cutting. In Arnish, to the south of the Development site, sheep numbers are higher and grazing here is more intense. As a result, the vegetation here is much less lush and there are more frequent and extensive patches of bare peat with signs of trampling.

Statutory Nature Conservation Sites (International/European)

9.5.4 Figure 9A.2 Statutory Nature Conservation Sites (**Appendix 9A**) illustrates the locations of the statutory nature conservation sites designated under international conventions or via European directives within the Study Area. These comprise:

- The Lewis Peatlands SAC, located to the west of the Proposed Development (1,065m from the closest proposed infrastructure); and
- The Lewis Peatlands Ramsar is designated, in part, for its blanket bog, and is located adjacent to and extends along the western and northern boundaries of the Development Site (<100m from the closest proposed infrastructure).

9.5.5 Sites designated primarily for ornithological interest are discussed in **Chapter 8**.

Statutory Nature Conservation Sites (National)

9.5.6 Figure 9A.2 (**Appendix 9A**) illustrates the locations of the statutory nature conservation sites designated under national legislation within the Study Area. These comprise:

- Tong Saltings SSSI (3.5km east of the Proposed Development); and
- Achmore Bog SSSI (2.4km south west of the Proposed Development).

Non-Statutory Nature Conservation Sites

9.5.7 No non-statutory nature conservation sites were recorded within the Study Area.

Habitats

9.5.8 A detailed summary of the habitats/vegetation communities present across the Development Site is presented in **Appendix 9B**.

- A Phase 1 Habitat map is presented in Figures 9B.1a-f.
- NVC maps are presented in Figures 9B.2a-n.

9.5.9 **Table 9.5** summarises the status and classification of the vegetation communities recorded within the survey area and identifies whether these have the potential to be groundwater dependant terrestrial ecosystems (GWDTE) under SEPA guidance (SEPA 2010).

Table 9.5 Vegetation Communities Recorded on Site

Community Type	Phase 1 Habitat Classification (JNCC, 2010)	NVC Community Code	Potential Groundwater Dependant Terrestrial Ecosystem? (SEPA 2010)
Blanket Bog/Mire Communities	Blanket bog, Modified Bog	M1 *Sphagnum denticulatum* bog pool	No
		M3 *Eriophorum angustifolium* bog pool	No
		M17a *Trichophorum cespitosum-Eriophorum vaginatum* blanket mire *Drosera rotundifolia - Sphagnum spp.* sub-community	No
		M17b *Trichophorum cespitosum-Eriophorum vaginatum* blanket mire *Cladonia* spp. sub-community	No
		M17mod modified *Trichophorum cespitosum-Eriophorum vaginatum* blanket mire (variant devised for survey)	No
		M19a *Calluna vulgaris-Eriophorum vaginatum* blanket mire *Erica tetralix* sub-community	No
Marshy grassland/ rush and pasture	Marshy grassland	M25a *Molinia caerulea-Potentilla erecta* mire *Erica tetralix* sub-community	Yes
		M23b *Juncus effusus/acutiflorus-Galium palustre* mire *Juncus effusus* sub-community	Yes

Community Type	Phase 1 Habitat Classification (JNCC, 2010)	NVC Community Code	Potential Groundwater Dependant Terrestrial Ecosystem? (SEPA 2010)
Flushes, soakways and springs: acidic and base-rich	Acid Flush	M6ci *Carex echinata-Sphagnum fallax* mire *Juncus effusus* sub-community *Sphagnum fallax* variant	Yes
		M6di *Carex echinata-Sphagnum fallax* mire *Juncus acutiflorus* sub-community *Sphagnum fallax* variant	Yes
	Basic flush	M10 *Carex dioica-Pinguicula vulgaris* mire	Yes
Dry Heath communities	Dry dwarf shrub heath, acid dry heath	H10a *Calluna vulgaris-Erica cinerea* heath Typical sub-community	No
		H10b *Calluna vulgaris-Erica cinerea* heath *Racomitrium lanuginosum* sub-community	No
		H12a *Calluna vulgaris-Vaccinium myrtillus* heath *Calluna vulgaris* sub-community	No
		H12c *Calluna vulgaris-Vaccinium myrtillus* heath *Galium saxatile-Festuca ovina* sub-community	No
Wet Heath communities	Wet heath	M15b *Trichophorum cespitosum-Erica tetralix* wet heath Typical sub-community	Yes
		M15c *Trichophorum cespitosum-Erica tetralix* wet heath *Cladonia spp.* sub-community	Yes
Acid Grassland communities	Semi improved acid grassland	U4b *Festuca ovina-Agrostis capillaris-Galium saxatile* grassland *Holcus lanatus-Trifolium repens* sub-community	No
Mesotrophic Grassland communities	Marsh/ marshy grassland	MG10a *Holcus lanatus-Juncus effusus* rush pasture typical sub-community	Yes
Broadleaved woodland	Planted broadleaved woodland		No
Coniferous woodland	Planted coniferous woodland		No

Groundwater Dependent Terrestrial Ecosystems

9.5.10 The NVC survey identified the presence of a number of potential GWDTEs within the Proposed Development Site.

9.5.11 A summary of NVC communities within the Study Area that may indicate the presence of GWDTE is provided within the Desk Study (**Appendix 9A**). Each potentially groundwater dependent area was allocated a unique number identifier and five separate NVC plant communities were assessed for actual groundwater dependence. A full description of this assessment and the GWDTEs is provided in **Chapter 11 Geology, Hydrology and Hydrogeology** and **Appendix 11F: GWDTE Risk Assessment**.

Watercourses and Waterbodies

9.5.12 The site is intersected by three river catchments, from north to south: River Laxdale (Abhainn Lacasdail), Glen River (Abhainn a' Ghlinn Mhoir) and the River Creed (Abhainn Ghrioda). The River Tope (Abhainn Leireabhaigh) is situated to the south of the Development Site. These are relatively small watercourses, crossing moorland/heath, with the River Creed being comparatively larger than the other watercourses. The watercourses are characterised by variable flow types, including riffle/run/glide sequences, and the water is generally less than 1m deep with variable substrates comprising mainly cobble, pebble and boulder. The watercourses connect a number of freshwater lochs on the Development Site. Further details of these watercourses and waterbodies are included in **Chapter 11.**

Species

Otter

9.5.13 Otter surveys conducted between September 2018 and January 2019 identified relatively widespread distribution of otter activity along waterbodies within the Development Site, in the form of spraints, paths, prints, feeding signs and resting sites (comprising holts and couches). Areas of highest otter activity appear to be located within the Abhainn Ghrioda catchment, surrounding Loch a Chlachain, the Abhainn Ghrioda watercourse and associated tributaries, Loch Speireag and Fedan Loch Lochan. This generally accords with the findings of the 2011 surveys.

9.5.14 Further details on the methods and findings of the otter field surveys together with the results of an ecological desk study are detailed in the technical baseline report (**Appendix 9C: Otter Survey 2018/19**).

Freshwater Fish

9.5.15 The watercourses that cross the Development Site, and the River Tope to the south, support salmonid fisheries, mainly comprising Atlantic salmon (*Salmo salar*) and sea trout/brown trout (*Salmo trutta*)[9], as well as eels (*Anguilla anguilla*) and three-spined stickleback (*Gasterosteus aculeatus*).

9.5.16 Salmon were not recorded on the Glen River in 2010 or 2018, but were recorded on the other three watercourses. The 2010 and/or 2018 fish surveys of the site recorded very high (or 'excellent') densities of salmon fry and salmon parr on the River Creed and River Tope. Salmon fry and parr were recorded at 'excellent' and 'good' densities respectively on the River Laxdale in 2018. Sea/brown Trout were recorded on all four watercourses, with trout fry and parr reaching very high densities on the River Creed, Glen River and River Tope and high densities on the River Laxdale.

9.5.17 Sea Lamprey has previously been recorded on the River Creed (https://scotland.nbnatlas.org/). One or more lamprey species (brook lamprey (*Lampetra planeri*), river lamprey (*Lampetra fluviatilis*) or sea lamprey (*Petromyzon marinus*)) could occur within the catchments of watercourses that cross the Development Site.

9.5.18 Further details on the methods and results of the freshwater fish surveys undertaken in 2018 are detailed in the technical baseline reports (**Appendix 9D**). The 2010 fish surveys at approximately the same survey locations are reported in detail in the 2012 Stornoway Wind Farm ES.

[9] Sea trout and brown trout are the same species, however sea trout are anadromous, migrating to the sea as juveniles and returning to rivers as adults to spawn.

Freshwater Pearl Mussel and Other Freshwater Invertebrates

9.5.19 Previous (2010/11) freshwater invertebrate surveys of the Development Site are reported in detail in the Stornoway Wind Farm 2012 ES and focused on the River Creed, Glen River and River Laxdale. These surveys recorded diverse assemblages of common and widespread invertebrate species that are typical of small upland watercourses in north Scotland and with no rarities or protected species recorded. The assemblages recorded were indicative of clean/unpolluted, well-oxygenated conditions in these watercourses (which were slightly acidic).

9.5.20 Previous (2010/11) freshwater pearl mussel surveys of the watercourses that cross the Development Site are also reported in detail in the 2012 Stornoway Wind Farm ES. The reaches sampled are distributed throughout the Development Site and were recorded as mainly unsuitable or sub-optimal habitat for freshwater pearl mussels; and none were found. A subsequent freshwater pearl mussel survey of two locations (one towards the upstream limit of the Development Site and one downstream of the Development Site) on the River Creed was undertaken as part of the planning application for Sandwick North Street Community Wind Turbine (Ellendale Environmental 2017). This survey recorded 'low suitability' habitat for this species at the survey location on the upper Creed and 'medium suitability' habitat at the survey location on the lower Creed but no freshwater pearl mussels were recorded.

Future Baseline

9.5.21 Determining a future baseline draws upon information about the likely future use and management of the site in the absence of development, known population trends (for species), climate change and any other proposed developments (consented or otherwise) that may act cumulatively with the Proposed Development to affect ecological features.

9.5.22 It is unlikely that in the absence of the Proposed Development, any future baseline would be markedly different from the current baseline. Land use/management is currently anticipated to remain largely unchanged in the absence of development and it is therefore considered appropriate to use the current baseline for the purpose of this assessment.

9.5.23 There are emerging, downward trends in the status of some freshwater fish populations, including migratory salmonids, on watercourses throughout Scotland/UK, which could also influence the future baseline ecological status of watercourses/waterbodies. There are however also legal drivers (Water Environment and Water Services (Scotland) Act 2003) with the objective of achieving 'no deterioration' and 'enhancement' in the ecological status of waterbodies/watercourses, including fish populations. It is therefore appropriate to conclude that the future baseline status of freshwater ecological receptors would not be markedly different from the current baseline and use the current baseline for the purpose of the assessment of effects on freshwater ecology.

9.6 Consultation

9.6.1 **Table 9.6** provides a summary of consultee comments about the Proposed Development and how these have been considered in this assessment.

wood.

Table 9.6 Summary of Consultee Comments Regarding Ecology

Consultee	Comments	Response and How Considered in this Chapter	Section Ref
Forestry Commission Scotland (July 2018)	Up to 8 turbines are to be located either within or immediately adjacent to the woodland areas. The scale of tree felling required to accommodate the wind turbines and supporting infrastructure (e.g. a borrow pit or an access track) is difficult to predict. The impact on the woodland asset is similarly difficult to assess, for which reason FCS would welcome the inclusion of a dedicated Forestry chapter within the EIA report for the proposed development.	Coniferous plantation woodland has been scoped out of the ecology assessment (see Table 9E.2 in **Appendix 9E**). A dedicated forestry chapter has not been included in the EIA Report, however **Appendix 9J** sets out the forestry position for the EIA.	**Appendix 9J** **Section 9.8**
	The scale of woodland removal (both temporary, to accommodate construction, and permanent – for infrastructure, and potentially, as a result of future habitat management proposals) needs to be clearly stated within the EIA report. FCS expects to see information on areas that are to be replanted post construction on-site, and areas of permanent woodland loss, for which compensatory planting might be required. FCS will seek that the requirement for compensatory planting (should there be any permanent loss) was a condition of approval and that planting had to be in place prior to construction commencing. There may be requirement for a Compensatory Planting Plan.	The scale of woodland removal is considered in Appendix 9J Compensatory planting on the Development Site is not proposed as part of the EIA as afforestation of high- quality peat bog is considered to result in a net reduction in nature conservation value. (**Appendix 9J**). Instead, the outline HMP provides for some limited native planting across the Development Site (**Appendix 9I**)	**Appendix 9I**
SNH	As discussed with the applicant pre-scoping, we agree that the data previously collected will suffice for assessment of impacts upon freshwater pearl mussel and freshwater invertebrates. • Both Loch Orosay and Stornoway Castle Woodlands SSSIs has been de-notified since the 2011 application, so need not be considered further. • Achmore Bog SSSI is, in our view, at a distance beyond which we would not expect there to be connectivity with the development. • We agree with the identification of habitats and species of conservation concern to be scoped in.	Previously collected data on freshwater pearl mussel and freshwater invertebrates are used to inform the assessment. Loch Orosay and Stornoway Castle Woods SSSI have been scoped out of further assessment	**Appendix 9A,** **Appendix 9E,** **Appendix 9E**
	We note that the now-consented development was considered unlikely to have significant effects on the Lewis Peatlands SAC qualifying habitats. Please see HRA screening which draws the same conclusion.	**Appendix 8H** provides Habitats Regulations Screening	

Consultee	Comments	Response and How Considered in this Chapter	Section Ref
Comhairle nan Eilean Siar	Agrees with the developers undertaking to carry out surveys of otter at the substation and access track locations, and agrees that further work may be required depending on the initial findings of this work and on the advice of SNH.	Otter surveys were undertaken in 2018 and 2019, providing an up to date baseline for this species.	**Appendix 9C**
	Designated sites - Please note that Stornoway Castle Woods SSSI and the Loch Orasay SSSI have been declassified and are no longer designated. Therefore these two may be scoped out of the assessment for the EIA. Please ensure that data sets you are using for the assessment are up-to-date.	Loch Orosay and Stornoway Castle Woods SSSI have been scoped out of further assessment	**Appendix 9E**
	Species and Habitats of Conservation Concern – We agree that the potential impact and potential effects of the Proposed Development on biodiversity, specifically on the blanket bog, marshy grassland, acid flush, dry heath, wet heath, acid grassland, (GWDTESs) and watercourse habitats and on otters should be fully considered.	A scoping assessment has been undertaken for all species and habitats of conservation concern. Ecological features have been scoped in for further assessment where they occur within a ZoI of the Proposed Development.	**Section 9.7, Appendix 9E**
	The Comhairle is supportive of strategies to reduce negative effects and mitigate against predicted habitat and biodiversity loss. We would advise the developer to consult with SEPA and SNH for specialised advice and guidance on habitat restoration and on increasing biodiversity on the proposed site. For example, planting native woodland to increase biodiversity, create bird habitat and to offset carbon emissions.	Environmental Measures embedded into the Development Proposals would reduce negative effects and mitigate against predicted habitat and ecological loss. Additional mitigation, restoration and compensation proposals are proposed to address effects on sensitive blanket bog habitats and compensatory planting in specific areas to address forestry removal (**Appendix 9I**).	**Section 9.8** **Section 9.18**
SEPA	We consider that the following key issues must be addressed in the EIA process. To avoid delay and potential objection, the following information must be submitted in support of the application: a) Map and assessment of all engineering activities in or impacting on the water environment including proposed buffers, details of any flood risk assessment and details of any related CAR applications; b) Map and assessment of impacts upon GWDTE and buffers; c) Map and assessment of impacts upon groundwater abstractions and buffers; d) Peat depth survey and table detailing re-use proposals; e) Map and table detailing forest removal; f) Map and site layout of borrow pits; g) Schedule of mitigation including pollution prevention measures; h) Borrow Pit site management plan of pollution prevention measures;	All engineering activities with potential to impact the water environment (including GWDTEs) are considered and assessed fully within **Chapter 11**. All engineering activities with potential to impact upon peat are considered in the Peat Management Plan (**Appendix 9H**) and Peat Slide Risk Assessment (**Appendix 9H**, appendix E) This chapter includes the assessment of effects on ecological features associated with water bodies and watercourses	**Chapter 11** **Appendix 9H** **Section 9.15**

Consultee	Comments	Response and How Considered in this Chapter	Section Ref
	i) Map of proposed surface water drainage layout; j) Map of proposed water abstractions including details of the proposed operating regime; k) Decommissioning statement.	Environmental measures embedded into the development proposals are presented, including proposed buffers and details relating to pollution prevention measures. The assessment considers forestry removal and presents the extent of permanent or temporary habitat loss. Proposed environmental measures relating to woodland removal are presented, which would be developed and implemented in consultation with CnES, and SNH (**Appendix 9I**).	**Section 9.8** **Section 9.8**
Fisheries Management Scotland (FMS)	The Outer Hebrides Fishery Trust, the relevant Scottish District Salmon Fisheries Trust, should be consulted on the development proposals. The guidelines issued to District Salmon Fisheries Boards and Trusts in dealing with planning applications should be fully considered throughout the planning, construction and monitoring phases of the development.	The OHFT was consulted on the development proposals but no response received from the Outer Hebrides Fishery Trust. Wood E&IS invited the Trust to carry out an electrofishing survey but they were unable to do so due to other commitments. This survey was subsequently carried out by Mhor Ecology and the results are presented in this assessment.	**Appendix 9D**
Marine Scotland Science	The following is recommended, to be detailed in the EIA Report: • Site characterisation surveys; fully quantitative electrofishing surveys; and hydrochemical (including turbidity and flow data) sampling, to assess fish populations and water quality; • Appropriate site-specific mitigation measures; and • A robust integrated hydrochemical, macroinvertebrate and fish monitoring programme (before, during and after construction).	The assessment is informed by fully quantitative electrofishing surveys. Water quality is addressed in **Chapter 11**. Site specific mitigation measures are outlined in this chapter and will be incorporated into a Construction Environmental Management Plan (CEMP).	**Appendix 9D;** **Chapter 11** **Section 9.8**

9.7 Scope of the Assessment

9.7.1 The method for determining the scope of the assessment within the ecology chapter differs from that used in other technical chapters within this EIA Report in order to correspond with topic specific guidance (i.e. CIEEM 2018). However, the relevant receptors (i.e. ecological features), the spatial and the temporal scope are all defined in this section. The methodology followed has multiple stages, enabling the scope of the assessment to be progressively refined.

Ecological Features

Scoping - Determining Importance

9.7.2 For this ecological assessment the first stage in determining the scope of the assessment is to identify which ecological features identified through the desk study and field surveys (see **Section 9.5**) are 'important'[10] in the context of the Proposed Development. Following CIEEM (2018) guidance, the importance of ecological features is first determined with reference to UK legislation and policy and then with regard to the extent of habitat or size of population that may be affected by the Proposed Development.

9.7.3 As the importance of ecological features is determined with regard to the extent of habitat or size of population that may be affected by the Proposed Development, the level of importance can differ from that which would be conferred by legislative protection or identification as a conservation notable species and from one development to another. For example, watervole is important at a national level because it is a SBL species and has experienced a population decline of more than 25% in the last 25 years. However, a small population that could be affected by a development would be assessed as being of less than national importance if there is alternative well-connected and suitable habitat nearby that has the capacity to support individuals that may be displaced.

9.7.4 Wherever possible, information regarding the extent and population size, population trends and distribution of the ecological features has been used to inform the categorisation described in **Table 9.7** to determine importance for the purposes of this assessment. Where detailed criteria or contextual data are not available, professional judgement was used to determine the level of importance.

9.7.5 An explanation of all determinations of importance are provided in this section, **Table 9.8** (for scoped in ecological features) and **Appendix 9E** (Tables 9E.1 and 9E.2) (for all ecological features both those scoped in and out) to ensure transparency.

[10] Importance relates to the quality and extent of designated sites and habitats, habitat/species rarity and its rate of decline. Ecological features that are not considered to be important are those that are sufficiently widespread, unthreatened and resilient and with populations that will remain viable and sustainable irrespective of the Proposed Development.

Table 9.7 Importance of the Proposed Development for Ecological Features

Geographic Context of Importance	Example / Description
International or European	1. European sites including SPAs, SACs, candidate SACs and Sites of Community Importance (SCI), potential SPAs (pSPA) and possible SACs (pSACs) should also be considered in the same manner in accordance with National Planning Policy. 2. Areas of habitat or populations of species[11] which meet the published selection criteria based on discussions with SNH and field data collected to inform the EcIA for designation as a European site or Ramsar site, but which are not themselves currently designated at this level.
National	1. A nationally designated site including SSSIs and National Nature Reserves (NNRs). 2. Areas (and the populations of species which inhabit them) which meet the published selection criteria guidelines for selection of biological SSSIs but which are not themselves designated based on field data collected, and in agreement with SNH. 3. Scottish Biodiversity List (SBL) habitats and species, Red listed and legally protected species that are not addressed directly in Part 2 of the "Guidelines for Selection of Biological SSSIs" but can be determined to be of national importance using the principles described in Part 1 of the guidance. 4. Areas of Ancient Woodland e.g. woodland listed within the Ancient Woodland Inventory.
Regional	1. SBL species considered to be of regional importance in the context of published information on population size and distribution.
County	1. Local Nature Reserves and Non-statutory designated sites. 2. Areas which based on field data collected to inform the EcIA meet the published selection criteria for those sites listed above (for habitats or species, including those listed in relevant Local Biodiversity Action Plans) but which are not themselves designated.
Local	1. SBL habitats and species, Red listed and legally protected species that based on their extent, population size, quality etc are determined to be at a lesser level of importance than the geographic contexts above. 2. Common and widespread semi-natural habitats occurring in proportions greater than may be expected in the local context. 3. Common and widespread native species occurring in numbers greater than may be expected in the local context.
Negligible	1. Common and widespread semi-natural habitats and species that do not occur in levels elevated above those of the surrounding area. 2. Areas of heavily modified or managed land uses (e.g. hard standing used for car parking, as roads etc.)

9.7.6 Where protected species are present and there is the potential for a breach of the legislation, those species should always be considered as 'important' features. With the exception of such species receiving specific legal protection, or those subject to legal control (e.g. invasive species), all ecological features that were determined to be of negligible importance have been scoped out of the assessment at this stage. Furthermore, ecological features of local importance were also scoped out at this stage where there was a specific technical justification to do so. This is because effects on them would not influence the decision-making about whether or not consent should be granted for the Proposed Development (in other words a significant effect in EIA terms could not occur). This approach is consistent with that described in CIEEM 2018. Specific justification for exclusion of each of these ecological features is provided in **Appendix 9E** (Tables 9E.1 and 9E.2).

9.7.7 All legally protected species and ecological features that are of sufficient importance were then taken through to the next stage of the scoping assessment.

[11] This includes habitats and species listed under Annex I and Annex II of the Habitats Directive.

Spatial Scope

9.7.8 The construction, operation and decommissioning phases of the Proposed Development may result in the following direct and indirect environmental changes that could significantly affect ecological features/receptors:

- Land take for construction or decommissioning of infrastructure (turbine bases, access tracks, site compounds, borrow pits);
- Direct loss, harm or disturbance during construction or decommissioning;
- Changes to the surface hydrology that could affect drainage and/or dewatering;
- Disturbance as a result of light, noise and vibration;
- Pollution associated with accidental spillage of fuels, oils, run-off and dust emission i.e. via direct contact, air or water.

9.7.9 Key to establishing which environmental changes may result in likely significant effects, is the determination of a ZoI for each important ecological feature identified. ZoIs differ depending on the type of environmental change (i.e. the change from the existing baseline) as a result of the Proposed Development and the ecological feature being considered.

9.7.10 The most straightforward ZoI to define is the area affected by land-take and direct land-cover changes associated with the Proposed Development. This ZoI is the same for all affected ecological features.

9.7.11 By contrast, for each environmental change that can extend beyond the area affected by land-take and land-cover change (e.g. increased noise associated with construction activities within the land-take area), the ZoI may vary between ecological features, dependent upon their sensitivity to the change and the precise nature of the change. For example, a water vole might only be disturbed by noise generated close to its burrow, while nesting marsh harrier might be disturbed by noise generated at a much greater distance, and other species (e.g. many invertebrates) may be unaffected by changes in noise. In view of these complexities, the definition of the ZoI that extends beyond the land-take area was based upon professional judgement informed (as far as possible) by a review of published evidence (e.g. disturbance criteria for various species) and discussions with the technical specialists who are working on other chapters of the EIA Report.

9.7.12 It should be noted that the avoidance of potentially significant effects through the design process is implicitly taken into account through the consideration of each ZoI, as are standard construction practices that are common place. When scoping in or out ecological features from further assessment, environmental measures (see **Section 9.8**) associated with general good practice that are described within the Code of Practice for planning and development (BSI, 2013**)** and Good Practice during Wind Farm Construction (Scottish Renewables *et al*., 2015) have been taken in to account (e.g. dust suppression, appropriately scheduled vegetation removal etc.) and referenced in **Appendix 9E**.

9.7.13 Ecological features that are scoped into the assessment (i.e. those of sufficient importance occurring within a relevant ZoI) are summarised in **Table 9.8**, along with a summary of the explanation behind their inclusion. For each ecological feature presented in **Table 9.8**, the potential environmental changes and potential significant effects resulting from the Proposed Development are provided. Ecological features that are scoped out of the assessment are identified in Table 9E.2 (**Appendix 9E**).

wood.

Table 9.8 Likely Effects, ZoIs and Justification for Scoped in Ecological Features

Ecological Feature	Importance – Legislation and Policy	Importance – Proposed Development	Environmental changes and likely significant effects	Zone of Influence	Relevant assessment criteria and scoped in justification
Lewis Peatlands SAC - Otter	European	National	Disturbance/displacement effects to SAC otter population	32km from the proposed construction/ maintenance/ decommissioning area	Otter is a European protected species, an SBL Priority species and a designated feature of the Lewis Peatlands SAC. The Proposed Development footprint is outwith all areas specifically designated for otter populations; however, the Proposed Development is within the home range (generally acknowledged to be up to 32km[12]) of otters from this designated site and therefore construction activity may give rise to the disturbance of otters that are part of the SAC population and there may be impacts to their prey species – either from the placement of infrastructure or due to noise disturbance.
			Direct damage to resting sites and disturbance to individuals using resting sites due to elevated levels of disturbance (such as increased noise, lighting, and human presence) during construction/operation and decommissioning related works.	Non-breeding resting sites: 30m from the proposed construction/ maintenance/ decommissioning area (based on SNH protected species advice)	Otter resting sites and signs were recorded within the Study Area, along the majority of watercourses in all four catchments. 32 resting sites were recorded within the Study Area. Of these, 25 were identified as 'low' status and seven were identified as 'moderate' status. All recorded non-breeding holts were recorded at least 30m from proposed activities; however, one 'low status' resting place and another moderate status resting place were identified within a potential disturbance threshold (within 30m of proposed works areas). A European Protected Species (EPS) Licence is likely to be required should proposed works occur within a threshold of disturbance within 30m of a resting site.

[12] https://www.nature.scot/plants-animals-and-fungi/mammals/land-mammals/otter

Ecological Feature	Importance – Legislation and Policy	Importance – Proposed Development	Environmental changes and likely significant effects	Zone of Influence	Relevant assessment criteria and scoped in justification
				Breeding resting sites: 200m from the proposed construction/ maintenance/ decommissioning area (based on SNH protected species advice)	No 'high status' resting sites were recorded within the Study Area and no evidence of breeding was recorded; nonetheless, pre-construction surveys have the potential to identify a breeding site, which would require appropriate measures and potentially an EPS licence to avoid contravention of legislation.
			Temporary severance of otter habitat and commuting routes	Within the construction/ maintenance/ decommissioning area	Evidence of otter activity was recorded along a number of watercourses and waterbodies within the Study Area, in the form of spraints, paths, prints, feeding remains, and resting sites. The Proposed Development could therefore lead to temporary habitat severance and fragmentation of territories during construction or decommissioning phases, particularly during the construction of water crossings.
			Direct mortality due to construction related activities	Within the construction/ maintenance/ decommissioning area	Evidence of otter activity was recorded along a number of watercourses and waterbodies within the Study Area, in the form of spraints, paths, prints, feeding remains, and resting sites. The Proposed Development could lead to an increase in mortality as a result of vehicle collision during construction or decommissioning phases in particular.
			Reduction in habitat quality as a result of hydrological connectivity and pollution incidents and impacts on prey	River catchments (River Laxdale, Glen River, River Creed) that intersect the Development Site	Inputs of silt and other fine material including peat can cause damage to fish habitats and direct mortality to fish and fish eggs. During surveys undertaken in 2010, it was observed that spawning habitat for salmonids in most burns appeared to be limited in extent and therefore any loss or damage to such habitat would likely be detrimental to trout and salmon populations and hence to otters.

Ecological Feature	Importance – Legislation and Policy	Importance – Proposed Development	Environmental changes and likely significant effects	Zone of Influence	Relevant assessment criteria and scoped in justification
Tong Saltings SSSI	National	Local	Reduction in habitat quality as a result of hydrological connectivity, silt release and pollution incidents from construction activities	River catchments (River Laxdale, Glen River, River Creed) that intersect the Development Site	Tongs Saltings SSSI is located approximately 3.5km downstream of the site boundary. The Site is designated for its breeding bird assemblage, maritime cliffs, mudflats, saltmarsh and sand dunes. There is a potential effect pathway along the catchment of the River Laxdale, which could lead to reduction in habitat quality of SSSI features, notably saltmarsh.
Blanket bog/mire habitats (M1, M3, M17a, M17b, M17mod & M19a) **Rare bog species: *Sphagnum austinii***	European	National	Permanent loss and temporary damage to terrestrial habitats Indirect disturbance and changes to composition of plant communities resulting from hydrological change	Within the construction/ maintenance/ decommissioning area 50m beyond the Proposed Development site boundary	Blanket bog communities are the most abundant habitat within the Study Area and generally in good condition. These are a restricted and declining habitat in the UK and Europe. Blanket bog is a SBL Priority habitat and includes habitats / vegetation communities listed on Annex I to the EC Habitats Directive. However, there are frequent peat cuttings and areas of planted coniferous woodland, which have had detrimental impacts upon the condition of blanket mire plant communities within these areas. *Sphagnum austinii* is an important indicator species of undisturbed blanket bog and was mapped in M17a blanket mire vegetation. Three hummocks were recorded in a single location in M17a blanket bog. Overall, the Development Site is assessed as being of National importance for blanket bog including *Sphagnum austinii*. Land take and land use during construction is likely to lead to the loss/disturbance of this habitat and species.
Wet heath (M15b & M15c)	European	Regional	Permanent loss and temporary damage to terrestrial habitats Indirect disturbance and changes to composition of plant communities resulting from hydrological change	Within the construction/ maintenance/ decommissioning area 250m beyond construction/ maintenance/ decommissioning areas	Wet heath contains vegetation communities listed on Annex I of the EC Habitats Directive and is an SBL Priority habitat. The Development Site is assessed as being of Regional importance for wet heath. Land take and land use during construction and operation may lead to the loss/disturbance of this habitat. It may be also be sensitive to damage during construction works and contains GWDTE NVC communities (including M15 wet heath).

Ecological Feature	Importance – Legislation and Policy	Importance – Proposed Development	Environmental changes and likely significant effects	Zone of Influence	Relevant assessment criteria and scoped in justification
Dry heath (H10a & H10b)	European	Regional	Indirect disturbance and changes to composition of plant communities resulting from hydrological change	50m beyond construction/ maintenance/ decommissioning areas	Dry heath is an SBL Priority habitat and includes habitats / vegetation communities listed on Annex I to the EC Habitats Directive. Dry heath is always dominated by heather and localised but not extensive within the Development Site. It is generally in good condition supporting a typical range of species and with no, or very light, grazing. The Development Site is assessed as being of Regional importance for Dry heath. This habitat type was not recorded within the Proposed Development footprint. However, dry heath contains GWDTE NVC communities (including H10 dry heath), which may be sensitive to damage during construction works - please see GWDTE assessment (Appendix 11f).
Marshy grassland	National	County	Permanent loss and temporary damage to terrestrial habitats	Within the construction/ maintenance/ decommissioning area	Certain types of marshy grassland are SBL Priority habitat (Purple moor grass and rush pasture), which is commonly found around drained areas within the Study Area. However, the majority of this habitat comprises M25a, which is often symptomatic of degraded blanket bog and, together with M23b are generally impoverished and of low species diversity. The Development Site is assessed as being of County importance for marshy grassland. Land take and land use during construction may lead to the loss/disturbance of this habitat. Marshy grassland t also contains GWDTE NVC communities (including M25 mires and M23 rush pasture), which may be sensitive to damage during construction works.
			Indirect disturbance and changes to composition of plant communities resulting from hydrological change	250m beyond construction/ maintenance/ decommissioning areas	
			Indirect disturbance and changes to composition of plant communities resulting from hydrological change	250m beyond construction/ maintenance/ decommissioning areas	

Ecological Feature	Importance – Legislation and Policy	Importance – Proposed Development	Environmental changes and likely significant effects	Zone of Influence	Relevant assessment criteria and scoped in justification
Waterbodies (Rivers and Lochs)	National	National	Localised loss of, and modification to, watercourse habitat at watercourse crossing locations; pollution/sediment release leading to degradation of river and loch habitats.	River catchments (River Laxdale, Glen River, River Creed) that intersect the Development Site	Rivers and lochs that meet certain criteria are SBL habitats. The rivers on the site also support SBL species. The Proposed Development includes a number of bridge and culvert river crossings. Works on these crossings during the construction and decommissioning phases could disturb instream and bank habitats and have associated risks of silt/pollutant discharges to watercourses. The operational development is also likely to have limited associated pollution risk [only arising from maintenance activities which are likely to be small scale and infrequent].
Atlantic salmon	European	Regional	Deterioration in fish populations due to: loss of, or damage to, juvenile salmonid habitat at watercourse crossings; obstruction of spawning migration; harm to fish (direct physical harm/noise); degradation of fish habitats due to pollution/siltation; and harm to fish during operation (electromagnetic emissions).	River catchments (River Laxdale, Glen River, River Creed) that intersect the Development Site	The site supports comparatively high densities of salmon fry/parr, within the context of the Outer Hebrides Region. Atlantic salmon is a SBL species and has been subject to population declines on many rivers throughout Scotland. In the absence of a national or international nature conservation designation to protect the salmon populations associated with watercourses that cross the Development Site, or evidence to indicate that the populations/watercourses qualify for such designation, the Atlantic salmon populations are assigned 'Regional' importance. The Proposed Development includes a number of watercourse crossings. Works on these crossings during the construction and decommissioning phases could disturb instream habitats, create a temporary barrier to fish movement have associated risks of silt/pollutant discharges to watercourses. The operational development may have associated electromagnetic emissions and limited pollution risk.

Ecological Feature	Importance – Legislation and Policy	Importance – Proposed Development	Environmental changes and likely significant effects	Zone of Influence	Relevant assessment criteria and scoped in justification
Sea/Brown trout	National	Regional	Deterioration in fish populations due to: loss of, or damage to, juvenile salmonid habitat at watercourse crossings; obstruction of spawning migration; harm to fish (direct physical harm/noise); degradation of fish habitats due to pollution/siltation; and harm to fish during operation (electromagnetic emissions).	River catchments (River Laxdale, Glen River, River Creed) that intersect the Development Site	The site supports comparatively high densities of sea/brown trout fry/parr, within the context of the Outer Hebrides Region. Sea/brown trout is a SBL species. Sea trout in particular have been subject to population declines on many rivers throughout Scotland. The Proposed Development includes a number of watercourse crossings. Works on these crossings during the construction and decommissioning phases could disturb instream habitats, create a temporary barrier to fish movement have associated risks of silt/pollutant discharges to watercourses. The operational development may have associated electromagnetic emissions and limited pollution risk.
Lamprey (Sea lamprey, river lamprey and/or brook lamprey)	European	Local	Deterioration in fish populations due to: loss of, or damage to, juvenile/spawning habitat at watercourse crossings; disruption/obstruction of migration; harm to fish (direct physical harm/noise); degradation of fish habitats due to pollution/siltation; and harm to fish during operation (electromagnetic emissions).	River catchments (River Laxdale, Glen River, River Creed) that intersect the Development Site	No lamprey species were recorded during the fish survey however the catchments potentially support lamprey. All three UK lamprey species are SBL species. The Development Site has been assigned Local importance for Lamprey species populations on a precautionary basis, given the suitability of the habitats present and the possibility that one or more of these species may occur in low numbers within the Development Site and remained undetected during the surveys. The Proposed Development includes a number of watercourse crossings. Works on these crossings during the construction and decommissioning phases could disturb instream habitats, create a temporary barrier to fish movement have associated risks of silt/pollutant discharges to watercourses. The operational development may have associated electromagnetic emissions and limited pollution risk.

Ecological Feature	Importance – Legislation and Policy	Importance – Proposed Development	Environmental changes and likely significant effects	Zone of Influence	Relevant assessment criteria and scoped in justification
European eel	European	Regional	Deterioration in fish populations due to: loss of, or damage to, habitat at watercourse crossings; disruption/obstruction of migration; harm to fish (direct physical harm/noise); degradation of fish habitats due to pollution/siltation; and harm to fish during operation (electromagnetic emissions).	River catchments (River Laxdale, Glen River, River Creed) that intersect the Development Site	This SBL species has been recorded in watercourses on the Development Site and has been assigned as being of Regional Importance on a precautionary basis, recognising that it has been subject to steep population declines in the UK and Europe. The Proposed Development includes a number of watercourse crossings. Works on these crossings during the construction and decommissioning phases could disturb instream habitats, create a temporary barrier to fish movement have associated risks of silt/pollutant discharges to watercourses. The operational development may have associated electromagnetic emissions and limited pollution risk.
Three-spined stickleback	Local	Local	Deterioration in fish populations due to: loss of, or damage to, habitat at watercourse crossings; harm to fish (direct physical harm/noise); degradation of fish habitats due to pollution/siltation; and harm to fish during operation (electromagnetic emissions).	River catchments (River Laxdale, Glen River, River Creed) that intersect the Development Site	This species is common, abundant and widespread. The Proposed Development includes a number of watercourse crossings. Works on these crossings during the construction and decommissioning phases could disturb instream habitats and have associated risks of silt/pollutant discharges to watercourses. The operational development may have associated electromagnetic emissions and limited pollution risk.
Freshwater Pearl Mussel	National	Local	Indirect effects due to effects on host fish species (salmonids) as set out above; and degradation of habitats due to pollution/siltation.	River catchments (River Laxdale, Glen River, River Creed) that intersect the Development Site	Although this SBL species has not been recorded, the Development Site has been assigned Local importance for freshwater pearl mussel as it could occur within suitable habitats that are found within the catchments that cross the Development Site. Works on watercourse crossings during the construction and decommissioning phases could disturb river habitats/substrates and have associated risks of silt/pollutant discharges to watercourses. The operational development is also likely to have limited pollution risk.

Ecological Feature	Importance – Legislation and Policy	Importance – Proposed Development	Environmental changes and likely significant effects	Zone of Influence	Relevant assessment criteria and scoped in justification
					The effects on salmonids outlined above could also have adverse effects on freshwater pearl mussels indirectly because salmonids are host vectors of juvenile mussels and have an important role in the establishment of local populations.
Freshwater Invertebrates	National (certain species)	Local	Deterioration in species populations and assemblages due to loss of, or damage to, habitat at watercourse crossings and degradation of habitats due to pollution/siltation.	River catchments (River Laxdale, Glen River, River Creed) that intersect the Development Site	The freshwater invertebrate assemblages at the Development Site are characterised by common and widespread species. Works on watercourse crossings during the construction and decommissioning phases could disturb instream habitats and associated freshwater invertebrate assemblages and have associated risks of silt/pollutant discharges to watercourses. The operational development is likely to have limited pollution risk.

Temporal Scope

9.7.14 The temporal scope of the ecological assessment is consistent with the period over which the Proposed Development would be carried out and therefore covers a.) construction; b.) operation; and c.) decommissioning periods (as outlined in **Chapter 4**).

a. Construction of the Proposed Development would be completed over a period of up to 30 months. Working hours are likely to vary through the year, depending on day length, but would typically be 12 hours per day Monday to Friday, and 7-1pm on Saturdays (**Chapter 4**);

b. Operation of the Proposed Development is anticipated to run for 25 years; and

c. Decommissioning would be anticipated to take less than 6 months - wind turbines (towers, nacelle, hub, blades and electrical kiosk) and substations would be dismantled using a crane and removed from the Development Site, whilst access tracks and sub-surface infrastructure below 1m deep would likely remain in situ.

9.7.15 The environmental changes identified in **Section 9.7.8** could occur during the construction phase, operational phase and decommissioning phases of the Proposed Development. The effects of the environmental changes are considered with respect to their duration, frequency, timing and reversibility for each of the scoped in ecological features in **Table 9.8**.

9.8 Environmental Measures Embedded into the Development Proposals

9.8.1 An iterative design process has been carried out, (**Figure 3.2** and **Chapter 3**) and range of environmental measures have been embedded into the Proposed Development as outlined in **Chapter 4**. **Table 9.9** outlines how these embedded measures would influence the ecological assessment.

Table 9.9 Summary of the Embedded Environmental Measures and how these Influence the Ecological Assessment

Ecological Feature	Changes and Effects	Embedded Measures and Influence on Assessment
CONSTRUCTION PHASE:		
Blanket bog communities	Direct habitat loss and temporary disturbance during construction	Design measures for minimising effects to sensitive habitats include: The layout of the wind turbines has been designed to ensure that turbines are constructed on areas of peat of <3m where possible to minimise peat excavation on the Development Site (**Appendix 9H: Peat Management Plan**). Adopting the approach outlined in **Appendix 9F: Vegetation Sensitivity and Approach to Avoidance of Blanket Bog**, areas of most sensitive vegetation are avoided as much as possible, with preference to development in areas broadly categorised as lower sensitivity habitat including modified bog and areas of shallower peat. Access track layout was designed as far as reasonably practicable to use the minimum land take. In addition, all access track has been designed to be linear, without loops, to avoid creating islands of habitat fragmentation. The potential borrow pit search area, the permanent central/main substation and secondary substation, temporary construction compound and storage/laydown areas have been sited to avoid sensitive vegetation communities where possible.

Ecological Feature	Changes and Effects	Embedded Measures and Influence on Assessment
		Tight construction footprints would be adhered to in order to minimise damage to sensitive habitats. Foundations of all turbines would be excavated to bedrock (using either rock anchor, rock cage or excavation methods), and all access tracks on peat depths exceeding 1m would be of floating design (either Option A or Option B), to minimise effects on peat. The following measures would be incorporated in order to minimise construction effects to sensitive blanket bog habitats: • As part of an overarching Construction Environmental Management Plan (CEMP), a Peat Management Plan would be developed and submitted pursuant to a condition of the deemed planning permission (based on **Appendix 9H**), in consultation with the Project Ecologist and the relevant consultees, in advance of construction works commencing. This would include the method of removal and storage for vegetated turves and peat together with good practice reinstatement and restoration measures for the re-use of excavated peat within the Development Site; • Site supervision would be provided by a suitably experienced Environmental Clerk of Works (ECoW), who would be responsible for ensuring the successful implementation of embedded measures, including pollution prevention (see below), monitoring of buffers around construction areas and reference to areas of high ecological sensitivity, and adherence to current construction good practice; • Pre-construction surveys of all works areas over blanket bog would be undertaken by a suitably qualified ECoW in order to identify locations of any rare bog species (notably *Sphagnum Austinii*) and propose suitable avoidance buffers. • A Habitat Management Plan (HMP) would also be implemented with the aim of ensuring successful restoration and reinstatement of affected blanket bog and wet heath within the Development Site. The HMP would be submitted pursuant to a condition of the deemed planning permission, following consultation with SNH and SEPA.
Watercourses, otters and freshwater fish	Silt/sediment and pollutant release, damaging fish habitats (inc. spawning habitat), potentially harming fish and associated adverse effects on fish and otter populations.	The following measures have been incorporated in order to minimise the risk of pollution and to ensure that impacts on watercourses' are either avoided or reduced: • A Pollution Prevention Plan (PPP) and Pollution Incident Response Plan (PIRP) would be prepared and subject to consultation with SEPA and SNH in advance of any construction activities and implemented as part of the overall CEMP. This would set out site management and working practices and draw heavily upon SEPA's Pollution Prevention and Control Guidelines (PPGs); • All watercourse crossings would be designed in accordance with the SEPA Good Practice Guide for the Construction of River Crossings (2010) and, where culverts are required, have been designed in accordance with the CIRIA Culvert Design and Operation Guide (2010); • Bridge construction would be undertaken by vehicles operating from the bankside rather than in the watercourse; and • A construction area stand-off of at least 50m has been applied to all watercourses (except for watercourse crossing.

Ecological Feature	Changes and Effects	Embedded Measures and Influence on Assessment
Freshwater Fish	Obstruction of migration and associated adverse effects on fish spawning and recruitment. Risk of harm to fish during works at watercourse crossings.	Watercourse crossing designs/construction would be informed by SEPA Good Practice Guide for the Construction of River Crossings (SEPA 2010b) and CIRIA Culvert Design and Operation Guide (CIRIA 2010). Bridged watercourse crossings would be used where feasible/practicable. Where this is impracticable, bottomless culverts will be used, having the benefit over more conventional culverts of maintaining the existing channel bed, substrate and hydromorphology. Culverts/bridges would be installed (and decommissioned) from the bank, in low flows, outside the period October to May inclusive and where possible during the period July to September inclusive. This timing restriction would apply to any construction/excavation work within 30m of watercourses. Any damming/over-pumping during work on watercourse crossings would be accompanied by a fish rescue scheme under the supervision of an ECoW. Culverts would be subject to a programme of inspection throughout the construction and operation of the Proposed Development. An integrated fish, freshwater invertebrate and water quality and river habitat monitoring plan would be prepared and implemented by an experienced ecologist to monitor the effects of the construction and decommissioning of the Proposed Development on freshwater ecology.
	Loss/severance of, or damage to, watercourse habitat at watercourse crossings, including associated adverse effects on fish spawning and recruitment;	Watercourse crossing would be micro-sited to avoid unconsolidated gravel and pebble substrates and riffle habitats. Culverts would be a single pipe structure i.e. not comprising multiple pipes. Culverts would be full pipes where the base would be covered with a natural bed. Culvert construction would be supervised by the ECoW, with culverts transferred to watercourse crossings intact, avoiding mixing concrete near to watercourse crossings. With the exception of work at watercourse crossings a buffer/exclusion zone (50m radius) around watercourses would be implemented.
	Silt/sediment and pollutant release, damaging fish habitats (inc. spawning habitat), potentially harming fish and associated adverse effects on fish populations.	With the exception of work at watercourse crossing, a buffer/exclusion zone (50m radius) around the watercourse network would be implemented. Additional measures to minimise the risk of pollution sediment release to watercourses are set out in detail in **Chapter 11**. These include for example: avoiding construction activity and temporary or permanent infrastructure in flood zones, steeper gradients and areas at risk of peat slide. Drainage designs and a Peat Management Plan and Water Management Plan would avoid silt-laden run-off entering watercourses, directing drainage away from watercourses. Dewatering designs would allow collection and settlement of suspended sediment (silt traps, fences, straw bales or where necessary swales and settlement lagoons). A PPP and PIRP would be implemented as part of the CEMP. The ECoW would inspect all dewatering regularly and get any identified defects fixed within a day.
	Noise and vibration and associated harm to fish.	With exception of watercourse crossing (construction and operation), a buffer/exclusion zone (50m radius) around the watercourse network would be implemented, which would minimise noise/vibration effects on fish. Culverts would be installed (and decommissioned) from the bank, in low flows, outside the period October to May inclusive and where possible during the period July to September inclusive to avoid sensitive periods for fish. This timing restriction would also apply to any construction/ excavation work within 30m of watercourses. Construction of watercourse crossings would be completed over a period of short duration and taking care to minimise noise/vibration, such as avoiding impacts between plant and river bed/bank substrate and carefully lowering culverts into place. Other measures to be implemented as part of good site working practice to restrict noise emissions are detailed in **Chapter 12: Noise**.

Ecological Feature	Changes and Effects	Embedded Measures and Influence on Assessment
Freshwater pearl mussel (and other freshwater invertebrates)	Disturbance/harm to freshwater pearl mussel and other freshwater invertebrates due to habitat degradation and disturbance.	Freshwater pearl mussels were not recorded during surveys in 2010 of the watercourses that cross the Development Site and the majority of the habitats at the survey locations were recorded as sub-optimal or unsuitable for this species. This species is therefore unlikely to be affected by the development proposals. However, on a precautionary basis, each watercourse crossing would be inspected for this species in advance of construction, extending 50m upstream and downstream, to verify this conclusion. In the unlikely event that freshwater pearl mussel is recorded, the crossing would be micro-sited to avoid this species in consultation with SNH. The measures set out above to minimise effects on fish would also minimise effects of changes in downstream water quality on freshwater invertebrates.
Coniferous plantation woodland	Tree removal (direct habitat loss)	A Tree Removal Plan would be required along with a felling licence.
Otter	Disturbance, Kill /injure /destroy habitat, affect distribution.	A Species Protection Plan (SPP) for otter would be prepared to ensure compliance with legislation. It would include details of pre-construction surveys to check on the presence of otters and the following suite of embedded measures that would be implemented across the Development Site to avoid causing harm to, or disturbing this species: • During normal working hours throughout the construction period the ECoW would be onsite to ensure that all environmental measures relevant to otter are delivered and ensure compliance with legislation. • Avoid working or artificial lighting within 50m of watercourses/ waterbodies during the hours of darkness, taken to be 30 minutes before sunset to 30 minutes after sunrise. • All works in proximity to waterbodies / watercourses would follow measures outlined in the CEMP to ensure their complete protection against pollution, silting and erosion as further outlined in the PPP and PIRP; • Culverts would be fitted with mammal ledges and a suitably textured ramp extending to the level of the road; • Strict speed limits would be followed on access tracks during all phases of development, and 'otter crossing' signs would be placed on the access tracks at all water crossings; • Trenches, holes and pits would be kept covered at night or provide a means of escape for otters (and other fauna) that may become entrapped. Gates to compound areas would be designed sensitively to prevent mammals from gaining access and would be closed at night. Any temporarily exposed pipes would be capped when contractors are off site to prevent otter from gaining access; • Any lighting used to accommodate such works must be positioned to minimise light spill onto watercourses/ waterbodies. The ECoW would monitor otter activity upstream and downstream of the works using camera traps and may stop site activities at any time should they consider that the works are having a detrimental affect on otter; • An emergency procedure would be implemented by site workers if otter are encountered. All works within 30m would cease as soon as it is safe to do so, and the ECoW would inspect the site and define appropriate measures (if required); and

Ecological Feature	Changes and Effects	Embedded Measures and Influence on Assessment
		• Should construction activities take place at more than one watercourse at any one time, this would be subject to ECoW approval, to avoid any cumulative impact on otter activity. This includes any works taking place within 50m of the watercourse. EPS licence-specific measures to prevent disturbance to otters at resting sites within 30m of proposed works [Couch TN5 and Holt TN10]: • An ECoW would provide supervision during the works and would set up a 10m exclusion zone around the resting site in advance of works commencing; • A tool-box talk would be provided to all site construction workers to raise awareness of potential disturbance effects to otters; • Construction works on the access track and water crossings would be limited to daytime hours (avoiding early morning and early evening; and • Surveys would be undertaken prior to, during and following works to assess the status of the resting site.
OPERATIONAL PHASE		
Watercourses, otters and freshwater fish	Pollution	The majority of the specific measures applied during ongoing and operational activities relate to the application of good practice in terms of managing and controlling activities to minimise the risk of pollution upon receptors and hydrological features. A detailed explanation of the general site pollution control, emergency procedures and contingency planning is set out within **Chapter 9.** The potential risks to surface water during operation are likely to be limited and localised based on the planned turbine servicing works and the nature and volume of potentially polluting substances required. The operator would ensure a site-specific risk assessment is completed and that control measures are implemented to ensure all environmental risks are minimised. Storage, use and disposal of oils would be in accordance with good practice and SEPA guidance.
Freshwater fish	Electromagnetic emissions and harmful effects on fish.	Cabling along access tracks would be over 50m from the watercourse network and buried. In a limited number of instances where cables cross watercourses these would be installed on the bridge
Otter	Disturbance, Kill /injure /destroy habitat, affect distribution.	All operational and maintenance work requirements would be undertaken within working areas clearly defined in advance of works and the storage of materials would be restricted to areas of hardstanding e.g. permanent tracks, crane pads or substation and control building, and associated infrastructure.
DECOMMISSIONING PHASE		
All ecological features	Similar changes and effects to construction phase	During the decommissioning of the Proposed Development, potential effects on ecological features are expected to be similar to those encountered during the construction phase and therefore similar environmental measures would be required. Any new legislation published prior to decommissioning would be adhered to and incorporated into an EMP prior to decommissioning taking place.

9.9 Assessment Methodology

Introduction

9.9.1 The generic project-wide approach to the assessment methodology is set out in **Chapter 4**, and specifically in **Section 4.2**. However, whilst this has informed the approach that has been used in this ecological assessment, it is necessary to align to the standard industry guidance provided by CIEEM (2018).

9.9.2 The assessment has been based upon not only the results of the desk study and field surveys, but also relevant published information (for example on the status, distribution, sensitivity to environmental changes and ecology of the features scoped in to the assessment, where this information is available), and professional knowledge of ecological processes and functions.

9.9.3 For each scoped-in ecological feature (see **Table 9.8**), potential effects were assessed against the current baseline conditions for that feature during construction, operation and decommissioning.

9.9.4 Throughout the assessment process, the initial results of the assessment regarding potentially significant effects have been used to inform whether additional baseline data collection is required, together with the identification of environmental measures that should be embedded into the Proposed Development to avoid or reduce adverse effects or to deliver enhancements (see **Section 9.8**). The results of the assessment, as set out in **Section 9.10** to **9.17**, therefore reflect the final scheme design (i.e. incorporating the environmental measures described in **Section 9.8** and **Table 9.9**).

9.9.5 The spatial extent of the assessment (see **Table 9.8**) reflects the area occupied by the ecological feature that is being assessed and, as a minimum, the ZoI of the changes that may affect it.

9.9.6 Where part of a designated site is located within the ecological ZoI relating to a particular biophysical change as a result of the Proposed Development, an assessment has been made of the effects on the designated site as a whole. A similar approach has been taken for areas of notable habitat.

9.9.7 For species that occur within the ZoI, the assessment has considered the total area that is used by the affected individuals or the local population of the species (e.g. for foraging or as breeding territories) rather than the footprint of the Development Site.

Significance Evaluation Methodology

Overview

9.9.8 CIEEM (2018) defines a significant effect as one "*that either supports or undermines biodiversity conservation objectives for 'important ecological features' or for biodiversity in general*".

9.9.9 When considering potentially significant effects on ecological features, whether these be adverse or beneficial, the following characteristics of environmental change are taken into account[13]:

- Extent – the spatial or geographical area over which the environmental change may occur;
- Magnitude – the size, amount, intensity or volume of the environmental change;
- Duration – the length of time over which the environmental change may occur;

[13] The definitions of the characteristics of environmental change are based on the descriptions provided in CIEEM 2018. Other chapters in this EIA Report may use some of the same terms albeit with a different definition.

- Frequency – the number of times the environmental change may occur;
- Timing – the periods of the day/year etc. during which an environmental change may occur;
- Reversibility – whether the environmental change can be reversed through restoration actions.

Magnitude of Change

9.9.10 A scale for the magnitude of the environmental change as a result of the Proposed Development has been described in **Table 9.10** to provide an understanding of the relative change from the baseline position, be that an adverse or beneficial change.

Table 9.10 Guidelines for the Assessment of the Scale of Magnitude

Scale of Change	Criteria and Resultant Effect
High	The change permanently (or over the long-term) affects the conservation status of a habitat/species, reducing or increasing the ability to sustain the habitat or the population level of the species within a given geographic area and relative to the wider habitat resource/species population, a large area of habitat or large proportion of the wider species population is affected. For designated sites, integrity is compromised. There may be a change in the level of importance of the receptor in the context of the project ZoI.
Medium	The change permanently (or over the long term) affects the conservation status of a habitat/species reducing or increasing the ability to sustain the habitat or the population level of the species within a given geographic area and relative to the wider habitat resource/species population, a small-medium area of habitat or small-medium proportion of the wider species population is affected. There may be a change in the level of importance of this receptor in the context of the project ZoI.
Low	The quality or extent of designated sites or habitats or the sizes of species' populations, experience some small-scale reduction or increase. These changes are likely to be within the range of natural variability and they are not expected to result in any permanent change in the conservation status of the species/habitat or integrity of the designated site. The change is unlikely to modify the evaluation of the receptor in terms of its importance in the context of the project ZoI.
Very Low	Although there may be some effects on individuals or parts of a habitat area or designated site, the quality or extent of sites and habitats, or the size of species populations, means that they would experience little or no change. Any changes are also likely to be within the range of natural variability and there would be no short-term or long-term change to conservation status of habitats/species receptors or the integrity of designated sites.
Neutral	A change, the level of which is so low, that it is not discernible on designated sites or habitats or the size of species' populations.

Determining Significance - Adverse and Beneficial Effects

9.9.11 Adverse effects are assessed as being significant if the favourable conservation status of an ecological feature would be lost as a result of the Proposed Development. Beneficial effects are assessed as those where a resulting change from baseline improves the quality of the environment (e.g. increases species diversity, increases the extent of a particular habitat etc., or halts or slows down an existing decline). For a beneficial effect to be considered significant, the conservation status would need to positively increase in line with a magnitude of change of "high" as described in **Table 9.10**.

9.9.12 Conservation status is defined as follows (as per CIEEM, 2018):

- "*For habitats, conservation status is determined by the sum of the influences acting on the habitat that may affect its extent, structure and functions as well as its distribution and typical species within a given geographical area;*

- *For species, conservation status is determined by the sum of influences acting on the species concerned that may affect its abundance and distribution within a given geographical area*".

9.9.13 The decision as to whether the conservation status of an ecological feature would alter has been made using professional judgement, drawing upon the information produced through the desk study, field survey and assessment of how each feature is likely to be affected by the Proposed Development.

9.9.14 A similar procedure is used where designated sites may be affected by the Proposed Development, except that the focus is on the effects on the integrity of each site; defined as:

- "*The coherence of its ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was classified*".

9.9.15 The assessment of effects on integrity draws upon the assessment of effects on the conservation status of the features for which the site has been designated. Where these features are not clearly defined, which is often the case for non-statutory biodiversity sites, it is necessary to use professional judgement to identify the interest features or obtain additional information about the interest features from SNH, Scottish Wildlife Trust or the local planning authority responsible for identifying these sites, so that sufficient information on which to base an assessment is available.

9.10 Assessment of Effects: Lewis Peatlands Special Area of Conservation – Otter

Baseline Conditions

9.10.1 The Lewis Peatlands SAC is located approximately 900m from the western edge of the Development Site at its closest point. The SAC is designated for the following qualifying features: acid peat-stained lakes and ponds; blanket bog; clear water lakes or lochs with aquatic vegetation and poor to moderate nutrient levels; wet heathland with cross-leaved heath; and otter populations. The only feature considered for further assessment is otter given that it is a wide ranging species that is known to occur within the Development Site; the SAC is sufficiently distant from the Proposed Development that significant effects on all other features are unlikely.

Desk Study

9.10.2 A review of the most recent condition monitoring assessment of Lewis Peatlands SAC otter population was undertaken (Findlay *et al.*, 2015). The recommended condition assessment for the site was assessed as favourable. Evidence of otter was found at 89% of sites surveyed with a predicted occupancy of 90%. There was 100% occupancy in 2004 so there has been a reduction in positive sites, but no loss of positive 10km squares. The number of positive mink sites has reduced from 13 sites in 2004 to two in 2012, presumably as a result of the Hebridean Mink Project (eradication programme).

9.10.3 Two records obtained from Outer Hebrides Biological Recording group indicate the presence of otter within 2km of the Development Site.

9.10.4 A review of the otter survey report prepared by Waterside Ecology in 2010/11 for the 2012 Stornoway Wind Farm ES found that resting sites and signs were present along the majority of watercourses in all four catchments with a high density of signs found along the River Creed in the centre of the survey the area, and along the Allt na Craoibhe/Abhainn Leireabhaigh, which forms its southern boundary. Few signs were identified away from the watercourses and immediate riparian zone, the main exception being the otter paths linking catchments and sub-catchments. Paths crossing moorland often did so where watercourses or lochs came close to each together.

9.10.5 Evidence gathered during these surveys indicated that otters were present on the Development Site throughout the year.

Field Surveys

Otter surveys 2018/19

9.10.6 Otter surveys (following the same methods and Study Area as previous) were undertaken between September 2018 and January 2019 and identified relatively widespread distribution of otter activity along waterbodies within the Development Site, in the form of spraints, paths, prints and feeding signs; and resting sites (comprising holts and couches).

9.10.7 The locations of all recorded field signs are provided in **Appendix 9C** (Table 9C-A1), including grid references and detailed descriptions. Target Note (TN) reference numbers were applied to each resting site record, as detailed in Table 9C-A2. Figures 9C.2a otter field signs and 9C.2b otter resting places present the locations of otter field signs and resting features identified during the survey.

9.10.8 Evidence of otter activity was recorded along a number of watercourses and waterbodies within the Study Area, including Loch Garbhaig, Allt Loch Garbhaig, Allt Hulabie, Loch a’ Leadharain, Loch a Chlachain and Abhainn Ghrioda, Loch Speireag and Fedan Loch Lochan, Struth Thoma Dhuibhe, and Loch Briodag. Field signs observed included spraints, paths, prints and feeding remains. The greatest density of otter field signs was recorded along Abhainn Ghrioda and associated tributaries, which is also the largest catchment within the Development Site. Few signs were recorded away from the watercourses and immediate riparian zone.

9.10.9 During the survey, seventeen resting sites, including seven holts and ten couches were identified, with an additional fifteen potential resting sites also recorded within the Study Area. Several well-established paths that serve as important commuting and foraging routes for otter were also identified.

9.10.10 When comparing results of the 2018/19 otter survey to those conducted in 2010/11, levels of otter activity across the Proposed Development site appear to be relatively similar. Several of the resting sites recorded in 2010/11 displayed signs of continued use during the 2018/19 surveys, indicating that these features are relatively permanent and serve as important otter habitat.

9.10.11 A slight variation in the pattern and location of otter activity between the two survey periods was observed in some areas. For example, the level of otter activity recorded further west along the main stem of Abhainn Ghrioda in 2018/19 appears to have reduced when compared to results from 2010/11. Otter activity also appears to have reduced within the Abhainn a' Glinn Mhoir catchment (situated immediately north of the Pentland Road) during the 2018/19 surveys compared to 2011 surveys, in terms of a reduced number of fresh/ recent otter field signs. In contrast, several additional resting sites were identified along tributaries to the north and south of Abhainn Ghrioda during the 2018/19 otter survey when compared to those carried out in 2010/11.

Future Baseline

9.10.12 In the absence of the Proposed Development, otters are likely to continue to utilise the Development Site. Given the abundance of suitable potential shelter on the Development Site, it is likely that the limiting factor on the population is prey resource. Spraint analysis undertaken at the in 2011 identified otters to be mainly feeding on freshwater fish and frogs, with limited evidence of feeding in the marine environment. There is potential for otters to travel to the coast to feed if prey resources are reduced in the area of the Proposed Development. On this basis, it is assumed that the future baseline in respect of otter would be similar to the current baseline.

Predicted Effects and their Significance

Disturbance and displacement of the Lewis Peatlands SAC otter population including damage to resting sites (Construction)

9.10.13 The SAC is located upstream and approximately 900m from the Proposed Development. Given the distance from the Proposed Development, no otter resting sites within the SAC would be affected. However, individual otters supporting the SAC population will range over catchments connecting the Proposed Development and the SAC.

9.10.14 As an EPS, otters (and their resting sites) are classed to be of international importance and the Development Site is assessed as being of National importance for otters based on the survey results (see **Appendix 9E**).

9.10.15 During surveys in 2018/19, several well used and apparently long-established otter travel routes were identified on the Development Site and the location of these and resting sites were taken into account when designing the Proposed Development, to avoid potential disturbance of these features wherever possible. This included:

- The number of watercourse crossings (four bridge crossings and 12 culverted crossings) was kept to a minimum to reduce the risk of pollution to watercourses;
- All turbines and infrastructure have been located a minimum 50m from watercourses; and
- All construction works areas have been located a minimum 50m from resting sites with the exception of two resting sites (see **Section 9.10.13**).

9.10.16 No high-status resting sites were recorded and there was no evidence of breeding identified at any of the resting sites, which were categorised as being of moderate or low sensitivity (**Appendix 9C**).

9.10.17 Otters are highly mobile and can move away from areas of disturbance as the Development Site and wider areas are resource abundant for shelter; however, regardless of classification, any resting site that may be disturbed during construction or operation would have to be subject to the following site-specific measures and, if necessary, standard licensing procedures. Two resting sites are located within a 50m construction buffer and are also within a standard distance threshold (30m) for disturbance to otters and are considered further:

- Couch TN5 is located 14m from an access road and 23m from a watercourse crossing. The couch is assessed as a low status resting site, providing limited shelter in the form of a small sheltered alcove, which could provide suitable short-term shelter, but would be unlikely to provide prolonged day time use. Two other couches (TN6 and TN7) are situated within 75m and 100m respectively, as well as a holt (TN4) 190m away, providing alternative resting sites. Whilst the likelihood of disturbance to otters at this resting site is considered limited, given the proximity to the proposed construction area, as a precaution an EPS licence is likely to be required in order to avoid contravention of legislation protecting otters;
- Holt TN10 is located 30m from an access road and potentially within 30m from the works area around the turbine bases. Detailed plans are not currently available for the extent of works areas, therefore a precautionary approach assumes that there is likely to be a requirement to undertake works within 30m of the holt (unless the turbine is microsited beyond this 30m). The holt is assessed as a moderate status resting site, owing to the presence of a tunnel feature that stretches for approximately 4m, some cover provided by dense rushes and many prints, a

recent spraint and claw marks were present inside the feature. The resting site showed several signs of recent use and offers opportunity for more prolonged day time use. Further south along the same tributary, there are two holts and a couch (TN11, TN12 and TN13), approximately 125m, 275m and 335m respectively, providing alternative resting sites nearby. Given the proximity of two potential works areas and the greater likelihood of use, as a precaution an EPS licence is likely to be required in order to avoid contravention of legislation protecting otters.

9.10.18 Construction related disturbance/displacement effects to otters within the Development Site would be temporary and sporadic, and in light of the embedded measures outlined in **Table 9.9**, the magnitude of change would be low (and operational effects would be neutral).

9.10.19 Due to the extent of available watercourses/waterbodies and abundant resting sites within the Study Area that will remain undisturbed during construction and decommissioning, availability of foraging shelter habitat resource is not considered to be a limiting factor within the Development Site. Given the temporary nature of the construction works, the magnitude of change to the otter population that may form part of the Lewis Peatlands SAC population is considered to be low, and the resultant effect on the site's integrity and the species conservation status is not significant.

Temporary Severance of Otter Habitat and Commuting Routes (Construction)

9.10.20 There is also potential for construction activities to cause fragmentation of otter habitat and prevent the free movement of otters across their territories.

9.10.21 Access tracks have avoided crossing watercourses where possible, but due to the number of watercourses on the Development Site, and limitations regarding access locations, it is not possible for the development to take place without some being crossed. The Proposed Development includes four crossings and 12 culverted crossings. In the event that construction activities are scheduled to take place at more than one watercourse at any one time, this would be subject to ECoW approval, to avoid any cumulative impact on otter activity.

9.10.22 Whilst otter is present across the Development Site, otter territories are likely to cover many kilometres of watercourses/water bodies, potentially within four catchments (Abhainn Lacasdail (River Laxdale), Abhainn a Ghlinn Mhoir (Glen River), Abhainn Ghrioda (River Creed), and Abhainn Leireabhaigh (River Tope)), much of which would be largely unaffected. Furthermore, the Proposed Development is likely to represent only a very small proportion of an otter's foraging territory, with alternative routes available including overland routes, and as such, the works would not be expected to result in permanent blockage of existing commuting routes.

9.10.23 On this basis, and in light of the embedded measures outlined in **Table 9.9**, the temporary loss or barrier effects during the construction of watercourse crossings would result in a low magnitude of change to the otter population that may form part of the Lewis Peatlands SAC population, and the resultant effect on the site's integrity and the species conservation status is not significant.

Direct Mortality of Individual Otters (Construction)

9.10.24 Construction and decommissioning phases of the Proposed Development would bring vehicles to a previously undeveloped area, and therefore there is potential for otters to be hit by vehicles. However, with the adoption of the environmental measures detailed in **Table 9.9**, the risk of direct mortality to individuals during the construction and decommissioning phases is low and would result in a low magnitude of change to the otter population that may form part of the Lewis Peatlands SAC population, and the resultant effect on the site's integrity and the species conservation status is not significant.

Reduction in Habitat Quality as a result of Pollution Incidents (All Phases)

9.10.25 Whilst the access track and turbine layout were designed wherever possible to avoid sensitive otter features including resting sites and paths, it is also necessary to protect otters' food resource by avoiding pollution to the watercourses from the Proposed Development.

9.10.26 With the adoption of the environmental measures detailed in **Table 9.9**, degradation of food resource by pollution of habitats used by otter, during all phases of the Proposed Development is considered to be neutral. The overall magnitude of change to the otter population that may form part of the Lewis Peatlands SAC population is also considered neutral and the resultant effect on the site's integrity and the species conservation status is not significant.

Disturbance and Displacement of the Lewis Peatlands SAC Otter Population (Operation)

9.10.27 Operational effects on otters would be limited to potential occasional disturbance during routine maintenance and monitoring visits during the day to the Proposed Development. Such disturbance is likely to be sporadic, resulting in a 'very low' magnitude of change and the resultant effect on the Lewis Peatlands SAC's integrity and the species conservation status is not significant.

Disturbance and Displacement of the Lewis Peatlands SAC Otter Population (Decommissioning)

9.10.28 During the decommissioning of the Proposed Development, potential effects on otters would be expected to be similar in nature to those during the construction phase and similar environmental measures are likely to be employed. Any new legislation published prior to decommissioning would be adhered to and incorporated into a management plan prior to decommissioning taking place.

9.10.29 The resultant magnitude of change on the otter population that may form part of the Lewis Peatlands SAC population is considered to be low and the resultant effect on the site's integrity and the species conservation status is not significant.

9.11 Tong Saltings SSSI

Current Baseline

9.11.1 Tong Saltings SSSI is located 3.5km to the east of the Development Site and is designated for its breeding bird assemblage, maritime cliff, mudflats, saltmarsh and sand dunes.

9.11.2 The site contains one of the largest areas of saltmarsh and tidal flats in the Outer Hebrides and is the best representative intertidal system on the eastern seaboard. It lies at the confluence of two river estuaries, the intertidal flats have plentiful invertebrate fauna and grade into saltmarsh and *Calluna* heath. Sand dunes occur on the sand and shingle spit of Teanga Tunga and on the exposed eastern accreting spit and sandy shore at the head of Broad Bay. Maritime grassland covers Teanga Tunga and Steinish Island. The outcrops on the beaches are conglomerate rock.

9.11.3 The site is also important for wintering, breeding and feeding birds, including terns, waders and wildfowl.

Predicted Effects and their Significance

Habitat Damage Due to Silt Release and Pollution during Construction, Operation and Decommissioning

9.11.4 Potential effects on the hydrology of surface waters are addressed in detail in **Chapter 11**.

9.11.5 In summary, Tong Saltings SSSI is 3.5km downgradient of the Development Site, but the Abhainn Lacasdail (W01 – River Laxdale) (**Table 11.16**) connects two locations within the Development Site and would be a potential pathway for any, albeit diluted, effects.

9.11.6 Embedded environmental measures that look to protect this and other surface watercourses are extensive (**Section 11.8**). They include a 50m buffer zone applied to the entire river network, micro-siting of turbines, tracks and other infrastructure, careful access track drainage and watercourse crossing design (e.g. **Table 11.18**), and adherence to numerous relevant protocols, including the CEMP, good practice guidance regarding wind farm construction (Scottish Renewables *et al*., 2015) and the construction of river crossings, the FCS and SNH (2010) guidance, BS6031: 2009 Code of Practice for Earth Works, WAT-SG-29 on Temporary Construction Methods and any dewatering CAR registration or licence requirements (**Section 11.8**). Any dewatering would necessitate the use of silt traps, fences, straw bales, settlement lagoons, swales and SUDS, and any discharge to surface water would require consent from SEPA and would be subject to conditions attached to the consent. Other pollution prevention and emergency response planning measures are also relevant.

9.11.7 In summary, the effects on the River Laxdale would be limited to localised loss/disturbance of river habitats during installation of culverts and limited release of sediment at watercourse crossings. Through the implementation of embedded measures, the Proposed Development is anticipated to cause temporary (short term) change to the local hydrology regime (low magnitude), with negligible effects to the interest features of the SSSI. The effect on site integrity would be not significant.

9.12 Assessment of Effects: Blanket Bog Communities

Current Baseline

9.12.1 The vast part of the survey area is covered by blanket bog vegetation on deep peat.

9.12.2 The blanket bog in the Study Area conforms well to the documented NVC types (M1, M3, M17a, M17b) and it is considered to be in good condition throughout, except where drained for the planting of conifers. A detailed description of blanket bog vegetation communities is provided in **Appendix 9B**.

9.12.3 New peat continues to form and slowly deepen from the component mire species. Peat formation 'activity' is considered to be relatively high within the Study Area, with virtually no grazing over most of it, and the bog supports a very spongy and lush surface of mosses and lichens with vascular plants growing through it.

9.12.4 Parts of the blanket bog have undergone erosion in the past, resulting in dendritic gullying of the blanket bog. Although there is still some erosion in parts of the blanket bog, many of these areas now support actively re-generating vegetation and there is very little bare peat here compared to other areas of blanket bog on the Isle of Lewis and Scotland in general.

9.12.5 Around the edges of the blanket bog, where access is easier, there are many areas of peat cuttings. As a result, the peat is generally less deep but blanket bog species continue to grow and re-generate.

9.12.6 Although all the blanket bog is considered important, there are some areas that are particularly sensitive in nature, being generally much wetter, often with extensive pool systems. These have therefore been highlighted (**Appendix 9F**).

9.12.7 *Sphagnum austinii* is an important indicator species of undisturbed blanket bog and was mapped in M17a blanket mire vegetation. Three hummocks were recorded in a single location in M17a blanket bog. Full details of the NVC communities are provided in **Appendix 9B.** NVC communities are illustrated in Figures 9B.1a-m; a Phase 1 Habitat map is presented in Figures 9B.2a-f.

Future Baseline

9.12.8 Based on the 2011 baseline, the blanket bog habitat within the Development Site was found to be in healthy condition, with evidence of natural bog re-generation occurring in the previously disturbed peat cutting ground. Without the construction of the Proposed Development, over a 25-year timescale, it is likely that vegetation within peat cuttings would continue to re-establish within 3-5 years, as was observed at the time of survey. It is anticipated that peat cutting activity is likely to continue, with associated impacts on local hydrology. The current baseline is therefore considered to be representative of the future baseline.

Predicted Effects and their Significance

Direct Loss and Temporary Disturbance of Blanket Bog Habitats (Construction)

9.12.9 The Proposed Development would result in permanent habitat loss due to land take (prior to any habitat reinstatement or restoration) associated with the construction of access tracks, wind turbine foundations, crane pads, construction compounds, borrow pits and other associated infrastructure (Further details are provided in **Appendix 9G**).

9.12.10 The anticipated permanent blanket bog habitat loss as a result of the Proposed Development is expected to be 30.5 ha (comprising 28.92ha 'blanket bog' habitat and 1.58ha 'wet modified bog' habitat). These permanent habitat losses are broken down by plant communities in Table 9G.2 (**Appendix 9G)**.

9.12.11 A vegetation sensitivity classification was also undertaken (**Appendix 9F**) to provide an approach for avoiding or reducing impacts to very good quality blanket bog habitat.

9.12.12 The Development Site was sub-classified into specific areas on a traffic light scale (see **Table 9F-1** and Figure 9F.1).

- Areas containing higher percentage cover of M17a/M1 communities were classed as being of high sensitivity (red in **Table 9.11** and Figure 9F.1);
- Areas containing good quality blanket bog but largely drier (M17b type) with lower percentage cover of more sensitive M17a/M1 communities were classed as being of medium sensitivity (amber in **Table 9.11** and Figure 9F.1);
- Areas containing poorer blanket bog (usually a high concentration of peat cuttings) were also classed as being of medium sensitivity (yellow in **Table 9.11** and Figure 9F.1);
- Areas of modified blanket bog where it has previously been drained and planted with conifers (either modified or dried out through drainage or planting) were classed as being of low sensitivity (green in **Table 9.11** and Figure 9F.1).

9.12.13 **Table 9.11** provides a breakdown of predicted direct loss of for each vegetation sensitivity classification.

Table 9.11 Predicted Direct Loss of Sensitive Vegetation Communities

Vegetation Sensitivity Classification (See Paragraph 9.12.12)	Predicted Permanent Loss of Habitat (ha)	Total Areas of Habitat in Development Site (ha)	Percentage of Total Habitat in Development Footprint Affected by Construction
Red (high sensitivity)	1.4	182	0.8%
Amber (medium sensitivity)	24.3	1,007	2.4%
Yellow (medium sensitivity)	4.2	184	2.3%
Green (low sensitivity)	7.6	295	2.6%

9.12.14 Preference has been given to construct on the least sensitive habitats wherever possible.

9.12.15 In addition to direct habitat loss, it is expected that indirect or temporary disturbance to blanket bog habitat (that will be reinstated following construction) will occur within the following zones of influence (as discussed in **Appendix 9G**):

- A precautionary 25m disturbance zone around all turbine bases and the borrow pits; and
- A 10m hydrological disturbance zone around all other hard infrastructure comprising crane hardstandings, access tracks, substations, compounds, storage and laydown areas.

9.12.16 Based on calculations presented in Table 9G.5 (**Appendix 9G),** the anticipated temporary disturbance to blanket bog habitat loss during construction of the Proposed Development is estimated to be 77.7ha (comprising 76.8ha 'blanket bog' habitat and 0.9ha 'wet modified bog' habitat).

9.12.17 **Table 9.12** provides a breakdown of predicted temporary disturbance of for each vegetation sensitivity classification.

Table 9.12 Predicted Extent of Temporary Disturbance to Sensitive Vegetation Communities

Vegetation Sensitivity Classification (See Paragraph 9.12.12)	Predicted Temporary Loss of Habitat (ha)	Total Areas of Habitat in Development Site (ha)	Percentage of Total Habitat in Development Footprint Affected by Construction
Red (high sensitivity)	3.86	182	2.1%
Amber (medium sensitivity)	56.1	1,007	5.57%
Yellow (medium sensitivity)	12.8	184	6.96%
Green (low sensitivity)	9.14	295	3.1%

9.12.18 The Proposed Development is predicted to result in a temporary disturbance of 77.7ha blanket bog, of which 3.86ha of the highest sensitivity vegetation would be disturbed; a combined total of 68.86ha of medium sensitivity would be disturbed; and 9.14ha of low sensitivity would be disturbed.

9.12.19 The area of direct loss (30.5ha) comprises 2.17% of the blanket bog habitat resource and the area of temporary disturbance (77.7ha) comprises 5.5% within the Development Site. These areas combined equate to 7.8% of the blanket bog resource within the Development Site.

9.12.20 The Proposed Development would result in the direct loss of 30.5 ha of blanket bog together with potential indirect effects on 77.7 ha. The effects of this would be minimised through the implementation of good practice measures (**Table 9.9**), including proposals for full habitat re-instatement or restoration of temporarily disturbed habitat and the re-use of excavated peat within the Development Site. This would be a medium magnitude of change affecting a large area of blanket bog within the Development Site, which is assessed as being of National importance for this habitat. Although vegetation within the disturbed area would be expected to recover in the medium to longer term, the overall effect is considered to be **significant**.

Indirect Disturbance and Changes to Composition of Plant Communities Resulting from Hydrological Change (Construction)

9.12.21 The following assessment considers effects to blanket bog plant communities which are sensitive to changes to surface water or groundwater hydrology resulting from construction activities associated with the Proposed Development. Potential impacts on the hydrology of surface waters are addressed in detail in **Chapter 11**.

9.12.22 Across much of the Development Site, the water table in general would be expected to be close to the surface, often likely to be within 0.1m of the surface, to support the active blanket bog which is widely distributed within the Development Site.

9.12.23 The upper layer of peat (the acrotelm) can extend up to 0.5m below the surface and the water table naturally fluctuates throughout the year within this layer. The deeper catotelm layer (usually more than 0.5m below the surface) is located within the water table and is permanently saturated. Unmodified blanket bog vegetation requires a permanently raised water level which is derived directly from rainfall and in the case of peat deposits on slopes also through lateral seepage of rainfall in the acrotelm. The high-water level is maintained by high rainfall and the low hydraulic conductivity at lower levels within the peat profile (hydraulic conductivity, or permeability, is negatively correlated with the degree of peat humification, which decreases with peat depth). Blanket bogs often display complexes of hydrologically connected formations, or landforms, which develop primarily in response to the underlying topography.

9.12.24 Hydrological changes including fluctuations in water levels, flows and quality and physical disturbance of the peat, leading to derogation and/or pollution of groundwater and surface water and disruption and breakdown of peat structure supporting blanket bog communities can occur for a variety of reasons:

- Soil compaction and the introduction of areas of hardstanding during construction and throughout operation reducing recharge and groundwater levels;
- Dewatering during construction associated with the excavation of the turbine foundations and borrow pits leading to a decline in groundwater levels;
- Site activities during construction, operation and decommissioning resulting in the release of pollutants and the subsequent contamination of groundwater;
- Physical disturbance of the peat and groundwater throughflow could occur as a result of excavation works and peat stockpiling/removal;
- Disruption of flow paths and changes to drainage regime during construction and throughout operation can be associated with increases in runoff and less on-site water retention;

- Disruption of ground during construction leading to increased sediment loading; dewatering and/or drainage during construction disrupting groundwater support (baseflow) to watercourses; discharge to surface water of groundwater intercepted during construction associated with the excavation of the turbine foundations and borrow pits and increasing flows and sediment loading; and
- Site activities during construction, operation and decommissioning resulting in the release of pollutants and the subsequent contamination of surface waters.

9.12.25 On areas of peat depths greater than 1m (i.e. covering the majority of the Development Site), floating roads are proposed. In a floating road, the weight of the road is supported by the peat beneath, thereby avoiding the need to construct foundations extending through to the underlying solid stratum. Even with floating roads, some interruption of surface and near-surface flows can occur, which could in turn lead to loss of blanket bog specialised vegetation in nearby areas.

9.12.26 Changes in the local hydrological regime as a result of disturbance can be particularly accentuated if drainage ditches are placed in areas of deep peat. Although the area directly disturbed by the construction works is relatively localised, the nature of the peat is such that where the living bog vegetation is located, disturbance can result in a wider zone of potential hydrological perturbation. Longer-term, a change in surface water levels could result in a habitat dominated by plant species that prefer drier conditions, such as grasses and marginal or inundation species depending on the hydrological changes.

9.12.27 The Peat Slide Risk Assessment concludes that there is no significant risk of peat slide as a result of the construction of the Proposed Development (**Appendix 9H**).

9.12.28 The assessment of local hydrology in **Section 11.5** (**Chapter 11)**, anticipates no long term change to surface or subsurface water movement within the Development Site any more than five metres around each extraction (**Appendix 9F**). Effects would be further minimised through the implementation of good practice measures (**Table 9.9**), including proposals for full habitat re-instatement or restoration of temporarily disturbed habitat and the re-use of excavated peat within the Development Site.

9.12.29 In summary, the Proposed Development is anticipated to cause temporary (medium term) change to the local hydrology regime (low magnitude), with possible minor changes in the composition of blanket bog vegetation of National Importance up to five metres from proposed infrastructure . The effect on the conservation status of blanket bog resulting from hydrological change during construction would be not significant.

Direct Loss and Temporary Disturbance of Blanket Bog Habitats (Operation)

9.12.30 It is not expected that there would be any further direct loss or temporary disturbance of blanket bog and therefore no likely significant effects on this receptor during the operational phase.

Indirect Disturbance and Changes to Composition of Plant Communities Resulting from Hydrological Change (Operation)

9.12.31 It is anticipated that the operational phase of the Proposed Development would not result in further habitat loss or degradation beyond that identified above in respect of construction. It is however possible that there may be some localised changes to the composition of blanket bog communities within the vicinity of infrastructure due to changes in hydrology resulting from longer-term changes in surface water flows.

9.12.32 There should be no pollution or sedimentation to running water, unless major maintenance work was required on watercourse crossings or there was an accidental spillage of oil, concrete or other materials during maintenance of wind farm infrastructure. However, good practice would be adopted to minimise the potential for pollution or sedimentation events during maintenance works.

9.12.33 Any such effects are considered to be of 'low' magnitude and the effect on the conservation status of blanket bog resulting from hydrological change during operation would be not significant.

Direct Loss and Temporary Disturbance of Blanket Bog Habitats due to Land take associated with the Decommissioning of Site Infrastructure and Indirect Disturbance and changes to Composition of Plant Communities Resulting from Hydrological Change

9.12.34 During the decommissioning of the Proposed Development, potential effects on blanket bog communities would be expected to be similar in nature to those during the construction phase and similar environmental measures would be likely to be employed. Any new legislation published prior to decommissioning would be adhered to and incorporated into a management plan prior to decommissioning taking place.

9.13 Assessment of Effects: Wet Heath Communities

Baseline Conditions

9.13.1 Wet heath (NVC sub-communities M15b/c) is present where the blanket peat thins around knolls and hummocks across the Development Site. Wet heath can be variable in terms of heather cover and looks like, and often grades into, blanket bog. Areas of wet dwarf shrub heath can also occur throughout the blanket bog but is not usually extensive. Wet heath is an Annex I habitat and, where it occurs, is in good condition supporting a typical range of species:

- Indicative species of the M15b *Trichophorum cespitosum-Erica tetralix* wet heath (Typical sub-community) comprise: *Trichophorum cespitosum* (A), *Calluna vulgaris* (A), *Eriophorum angustifolium* (F), *Molinia caerulea* (F), *Erica tetralix* (F), *Narthecium ossifragum* (F), *Sphagnum capillifolium* (A);
- Indicative species of the M15c *Trichophorum cespitosum-Erica tetralix* wet heath *Cladonia spp.* sub-community comprise: *Calluna vulgaris* (F), *Trichophorum cespitosum* (F), *Erica cinerea* (F), *Racomitrium lanuginosum* (F), *Eriophorum angustifolium* (F), *Potentilla erecta* (F), *Molinia caerulea* (F), *Cladonia portentosa* (F), *Cladonia uncialis* (F).

9.13.2 Wet heath communities cover approximately 32ha of the Development Site.

Predicted Effects and their Significance

Direct Loss and Temporary Disturbance of Wet Heath Habitats due to Land take associated with the Construction of Site Infrastructure (Construction)

9.13.3 The anticipated direct loss of wet heath habitats during construction of the Proposed Development is expected to be 2.4ha, with an additional area of 1 ha anticipated to be temporarily disturbed during construction. These permanent habitat losses are broken down by plant communities in Table 9G.2 (**Appendix 9G**).

9.13.4 The area of direct loss (2.4ha) comprises 7.5% of the wet heath habitat resource and the area of temporary disturbance (1.3ha) comprises 4.1% within the Development Site. These areas combined equate to 11.6% of the wet heath resource within the Development Site.

9.13.5 The effects on wet heath would be minimised through the implementation of good practice measures (**Table 9.9**), including proposals for full habitat re-instatement or restoration of temporarily disturbed habitat and the re-use of excavated peat within the Development Site. Nevertheless, this would be a medium magnitude of change on wet heath within the Development Site over the short to long term. This would result in a **significant** effect on this Regionally important habitat, although vegetation within the temporarily disturbed area would be expected to recover in the medium term.

Indirect Disturbance and Changes to Composition of Plant Communities Resulting from Hydrological Change (Construction)

9.13.6 Potential effects on the hydrology of surface waters and GWDTEs are addressed in detail in **Chapter 11**.

9.13.7 The assessment of local hydrology does not anticipate long term change to surface or subsurface water movement. Effects would be further minimised through the implementation of good practice measures (**Table 9.9**), including proposals for full habitat re-instatement or restoration of temporarily disturbed habitat and the re-use of excavated peat within the Development Site. The Proposed Development is anticipated to cause temporary (medium term) change to the local hydrology regime (low magnitude), with potential minor changes to wet heath vegetation within the Development Site which is assessed as being of Regional importance for this habitat. The effect on the conservation status of wet heath resulting from hydrological change during construction would be not significant.

Direct Loss and Temporary Disturbance of Wet Heath Habitats due to Land Take (Operation)

9.13.8 It is not expected that there will be any direct loss or temporary disturbance of wet heath and therefore no likely significant effects on this receptor during the operational phase.

Indirect Disturbance and Changes to Composition of Plant Communities Resulting from Hydrological Change (Operation)

9.13.9 It is anticipated that the operational phase of the Proposed Development would not result in further habitat loss or degradation beyond that identified above in respect of construction, although it is possible that there may be some localised changes to the composition of wet heath communities during operation due to changes in hydrology resulting from longer-term changes in surface water flows.

9.13.10 However, effects would be further minimised through the implementation of best practice measures (**Table 9.9**). Accordingly, there should be no pollution or sedimentation to running water, unless major maintenance work was required on watercourse crossings or there was an accidental spillage of oil, concrete or other materials during maintenance of wind farm infrastructure.

9.13.11 Any such effects are considered to be of 'low' magnitude and the effect on the conservation status of wet heath resulting from hydrological change during operation would be not significant.

Direct Loss and Temporary Disturbance of Wet Heath Habitats due to Land take associated with the Decommissioning of Site Infrastructure and Indirect Disturbance and Changes to Composition of Plant Communities Resulting from Hydrological Change

9.13.12 During the decommissioning of the Proposed Development, potential effects on wet heath communities would be expected to be similar in nature to those during the construction phase and similar environmental measures would be likely to be employed. Any new legislation published prior to decommissioning would be adhered to and incorporated a management plan prior to decommissioning taking place.

9.14 Assessment of Effects: Dry Heath communities

Baseline Conditions

9.14.1 Dry heath (NVC sub-communities H10a and H10b) is present where the peat is free-draining and is characterised by a dense cover of heather and an absence of *Sphagnum* moss. It is restricted to the shallowest well-drained peats and can be found occasionally throughout the survey area where there are undulations in the underlying substrata sufficient to protrude through the blanket peat. Dry heath is therefore never very extensive, localised and variable in character.

9.14.2 Dry heath is an SBL Priority habitat and an Annex 1 habitat and, where it occurs, is considered to be in good condition supporting a typical range of species and with no or very light grazing. Around Arnish, to the south of the survey area, grazing levels are higher but impacts are only low to moderate.

9.14.3 The vegetation is characterised by a dominance of *Calluna vulgaris* forming an extensive uniform short canopy over a carpet of the hypnaceous mosses *Hylocomium splendens*, *Pleurozium schreberi* and *Hypnum jutlandicum*. *Potentilla erecta* is usually constant and sparsely dotted through the heather. Where the heath also had some *Erica cinerea* it most resembled the H10 community and where *Racomitrium lanuginosum* was also present it

9.14.4 Dry heath communities cover approximately 1.3ha of the Development Site.

Predicted Effects and their Significance

Indirect Disturbance and Changes to Composition of Plant Communities Resulting from Hydrological Change (Construction/Operation/Decommissioning)

9.14.5 Potential effects on the hydrology of surface waters are addressed in detail in **Chapter 11**.

9.14.6 The assessment of local hydrology does not anticipate long term change to surface or subsurface water movement. Effects would be further minimised through the implementation of good practice measures (**Table 9.9**), including proposals for full habitat re-instatement or restoration of temporarily disturbed habitat and the re-use of excavated peat within the Development Site. The Proposed Development is anticipated to cause temporary (medium term) change to the local hydrology regime (low magnitude), with potential minor changes to dry heath vegetation within the Development Site which is assessed as being of Regional importance for this habitat. The effect on the conservation status of dry heath resulting from hydrological change during construction would be not significant.

9.15 Assessment of Effects: Marshy Grassland Communities

Baseline Conditions

9.15.1 This habitat is generally impoverished and provides low species diversity on the Development Site. Marshy grassland comprises areas of mire totally dominated by purple moor-grass (M25a), dense with dead litter and with only a few sparse associates. The habitat is common around the areas of bog that have been drained for tree planting. Some areas of blanket bog also have a high cover of purple moor-grass which can resemble M25a and are transitional to it. Also included are areas of rush-pasture (M23), which resemble acid flush but are more neutral and lack the *Sphagnum* carpet. This community is found in small patches alongside channels and soakways along with M6, as well as larger stands close to the edge of the blanket bog where the ground is more improved.

- Indicative species of the M25a: *Molinia caerulea*, *Calluna vulgaris*, *Potentilla erecta* and *Hylocomium splendens*;
- Indicative species of the M23b: *Juncus effusus*, *Agrostis canina*, *Potentilla erecta*, *Anthoxanthum odoratum* and *Polytrichum commune*.

9.15.2 Marshy grassland communities cover approximately 18ha of the Development Site.

Predicted Effects and their Significance

Direct Loss and Temporary Disturbance of Marshy Grassland due to Land take associated with the Construction of Site Infrastructure (Construction)

9.15.3 The anticipated direct loss of marshy grassland during construction of the Proposed Development is expected to be 0.03ha, with an additional area of 0.14ha anticipated to be temporarily disturbed during construction. These permanent habitat losses are broken down by plant communities in Table 9G.2 (**Appendix 9G**).

9.15.4 The area of direct loss (0.03ha) comprises 0.2% of the marshy grassland resource and the area of temporary disturbance (0.14ha) comprises 0.8% within the Development Site. These areas combined equate to 1% of the marshy grassland resource within the Development Site, which is assessed as being of County importance for this habitat.

9.15.5 Direct loss and temporary disturbance of marshy grassland during construction activities is anticipated to be of a very low magnitude of change in the short to medium term. The resultant effect on its conservation status is not significant.

Indirect Disturbance and Changes to Composition of Plant Communities Resulting from Hydrological Change (Construction)

9.15.6 Potential effects on the hydrology of surface waters are addressed in detail in **Chapter 11**.

9.15.7 The assessment of local hydrology does not anticipate long term change to surface or subsurface water movement. Effects would be further minimised through the implementation of good practice measures (**Table 9.9**), including proposals for full habitat re-instatement or restoration of temporarily disturbed habitat. The Proposed Development is anticipated to cause temporary (medium term) change to the local hydrology regime (low magnitude), with potential minor changes to marshy grassland vegetation within the Development Site which is assessed as being of County importance for this habitat. The effect on the conservation status of marshy grassland resulting from hydrological change during construction would be not significant.

Direct Loss and Temporary Disturbance of Marshy Grassland due to Land take associated with the Construction of Site Infrastructure (Operation)

9.15.8 It is not expected that there would be any direct loss or temporary disturbance of marshy grassland and therefore no likely significant effects on this receptor during the operational phase.

Indirect Disturbance and Changes to Composition of Plant Communities Resulting from Hydrological Change (Operation)

9.15.9 It is anticipated that the operational phase of the Proposed Development would not result in further habitat loss or degradation beyond that identified above in respect of construction, although it is possible that there may be some localised changes to the composition of marshy grassland communities during operation due to changes in hydrology resulting from longer-term changes in surface water flows.

9.15.10 Similarly, there should be no pollution or sedimentation to running water, unless major maintenance work was required on watercourse crossings or there was an accidental spillage of oil, concrete or other materials during maintenance of wind farm infrastructure. However, good practice would be adopted to minimise the potential for pollution or sedimentation events during maintenance works.

9.15.11 Any such effects are considered to be of 'low' magnitude and the effect on the conservation status of marshy grassland resulting from hydrological change during operation would be not significant.

Direct Loss and Temporary Disturbance of Marshy Grassland due to Land take associated with the Decommissioning of Site Infrastructure and Indirect Disturbance and Changes to Composition of Plant Communities Resulting from Hydrological Change

9.15.12 During the decommissioning of the Proposed Development, potential effects on marshy grassland communities would be expected to be similar in nature (although not necessarily in extent or intensity as tracks and sub-surface infrastructure below 1m are expected to remain in situ) to those during the construction phase and similar environmental measures would be likely to be employed. Any new legislation published prior to decommissioning would be adhered to and incorporated into a management plan prior to decommissioning taking place.

9.16 Assessment of Effects: Waterbodies (Rivers and Lochs)

Baseline Conditions

9.16.1 The site is intersected by three river catchments, from north to south: River Laxdale (Abhainn Lacasdail), Glen River (Abhainn a' Ghlinn Mhoir) and the River Creed (Abhainn Ghrioda). The River Tope (Abhainn Leireabhaigh) is situated to the south of the Development Site. These are relatively small watercourse reaches, crossing moorland/heath, with the River Creed being comparatively larger than the other watercourses. The watercourses are characterised by variable flow types, including riffle/run/glide sequences, and water depth is generally less than 1m with variable substrates comprising mainly cobble, pebble and boulder.

9.16.2 Rivers that meet certain criteria (BRIG (ed. Ant Maddock) 2008, updated 2011) are SBL habitats. The watercourses that cross the Development Site support a number of SBL species (for example Atlantic salmon, eel and otter) and are assumed to qualify as SBL habitats on a precautionary basis. Similarly, the watercourses connect a number of freshwater lochs on the Development Site, which are assumed to qualify as Oligotrophic and Dystrophic Lakes, which is also an SBL habitat type.

9.16.3 SEPA categorises rivers according to their 'ecological status' in accordance with the Water Framework Directive (WFD). The River Creed is at 'High' ecological status (fish and invertebrates are at high status). The River Laxdale is at 'Good' ecological status (fish at high status and invertebrates at good status). The River Tope is at High ecological status (fish and invertebrates are at high status). The ecological status of the Glen River is not currently indicated on the SEPA web tool.

Predicted Effects and their Significance

Habitat Loss/Damage and Temporary Disturbance (Rivers and Lochs) during Construction

9.16.4 The Proposed Development is not predicted to alter flow or water levels in waterbodies (**Chapter 11**). Therefore, potential effects of the Proposed Development are related to the disturbance of the watercourse habitats during the construction of watercourse crossings; the release of sediment/silt into the channel during construction and risk of accidental pollution spills..

9.16.5 The effects on waterbodies (rivers and lochs) would be minimised through the implementation of embedded environmental measures (**Table 9.9**), which would result in construction/decommissioning effects on watercourses being limited to localised loss/disturbance of river habitats during installation of culverts and limited release of sediment at watercourse crossings, which would be localised, temporary and of short duration.

9.16.6 During construction, the Proposed Development would result in a low magnitude of change over a short duration and not alter the conservation status of waterbodies (rivers and lochs) considered to be of National importance. The effects would be not significant.

Habitat Loss/Damage and Temporary Disturbance (Rivers and Lochs) during Operation

9.16.7 The potential risks to watercourse habitats during the operation of the Proposed Development are likely to be limited and localised, relating to planned turbine servicing works. The operator would ensure a site-specific risk assessment is completed and that control measures are implemented to ensure major environmental risks are minimised. Storage, use and disposal of oils would be in accordance with good practice and SEPA guidance (refer to **Chapter 11**).

9.16.8 During operation, the Proposed Development would result in a very low magnitude of change and not alter the conservation status of waterbodies (rivers and lochs). The effects would be not significant.

Habitat Loss/Damage and Temporary Disturbance (Rivers and Lochs) during Decommissioning

9.16.9 During the decommissioning of the Proposed Development, potential effects on waterbodies (rivers and lochs) would be expected to be similar to those during the construction phase. Similar environmental measures as those embedded in the design/construction phase would be employed to mitigate the effects of decommissioning on waterbodies. Any new legislation published prior to decommissioning would also be adhered to and reflected/incorporated in the environmental measures (an EMP) to be implemented during decommissioning.

9.17 Assessment of Effects: Fish

Baseline Conditions

9.17.1 The watercourses that cross the Development Site support salmonid fisheries, mainly comprising Atlantic salmon and sea/brown trout, as well as eels and three-spined stickleback. Previous (2010) fish surveys of the site, reported in the Stornoway Wind Farm 2012 ES recorded very high densities of salmon fry and salmon parr on the River Creed and River Tope, the latter being to the south of the Development Site. Trout were recorded on all four watercourses, with trout fry and parr reaching very high densities on the River Creed, Glen River and River Tope.

9.17.2 Sea Lamprey has previously been recorded on the lower River Creed and one or more lamprey species could occur within catchments of watercourses that cross the development site.

9.17.3 The baseline status of fish populations within the Development Site and neighbouring catchment (River Tope) in 2018 is set out in detail in the appended survey report (**Appendix 9D**) and briefly summarised in **Table 9.13**. The numbering of survey sites is non-consecutive due to previous changes in the numbering of sites (no survey sites are omitted).

- On the River Creed salmon fry, salmon parr and trout fry occur up to densities categorised as 'Excellent' and trout parr occur up to densities categorised as 'Good';
- Juvenille salmon were absent from the Glen River, where trout fry occur up to densities categorised as 'Excellent' and trout parr up to densities categorised as 'Good';
- On the River Laxdale salmon fry occur up to densities categorised as 'Excellent' and salmon parr at densities up to 'Good'; Trout fry and parr occur up to densities categorised as 'Good';
- On the River Tope salmon fry occur up to densities categorised as 'Excellent' and salmon parr at densities up to 'Good'; Trout fry occur up to densities categorised as 'Excellent' and trout parr up to 'Moderate'.

9.17.4 **Appendix 9D** briefly compares the baseline status of fish species recorded in 2018 with their status reported previously in the 2012 Stornoway Windfarm 2012. However, limited emphasis is placed on apparent differences/trends in fish numbers/densities between the two survey years in this EIA report, recognising that two years of survey data are insufficient to inform definitive conclusions on trends in fish populations.

Table 9.13 Baseline Status of Fish (2018)

River and Survey Location (Figure 9D)	Density Classification (Salmonids)	Habitat Utilisation Potential (Salmonids)	Habitat Quality (Salmonids)	Other Species	Summary Description (Fish Habitat)
River Creed (CRE01)	Salmon Fry: Excellent Salmon Parr: Good Trout fry: Good Trout parr: Good	Moderate / High	Moderate	Eels (x19); Three-spined stickleback (x17)	Juvenile & adult salmonid habitat. Flow type run/riffle/glide sequences with deep pool and weir 20m upstream. Wet width ~8m. Depth ranging from 11-90cm. Cobble/pebble/gravel substrate with boulder and bedrock upstream. Moderate instream cover. Undercut bank in places providing moderate bankside cover. Adjacent land is moorland heath and road/bridge downstream.
River Creed (CRE03)	Salmon Fry: Excellent Salmon Parr: Good Trout fry: Good	High	Good	Eels (x6);	Juvenile & adult salmonid habitat. Flow type run/riffle sequences. Wet width ranging from 8-12m. Depth ranging from 11- 75cm. Cobble/pebble/gravel substrate with boulder. Moderate instream cover. Undercut bank both sides providing moderate/good bankside cover. Adjacent land is moorland heath. Spawning habitat in survey area.
River Creed (CRE05)	Salmon Fry: Excellent Salmon Parr: Excellent Trout fry: Good Trout parr: Good	Moderate / High	Moderate	Eels (x1);	Juvenile salmonid habitat. Flow type run/riffle sequences with large pool at bottom of run (not included in survey – good adult holding area). Wet width ~8m. Depth ranging from 21- 70cm. Cobble/pebble/gravel substrate with boulder and small area of bedrock on left bank. Moderate instream cover. Undercut bank both sides providing good bankside cover. Adjacent land is moorland heath. Spawning habitat in survey area.
River Creed (CRE06)	Salmon Fry: Poor Salmon Parr: Poor Trout fry: Very Poor Trout parr: Very Poor	Moderate / High	Moderate	Eels (x3); Three-spined stickleback (x2)	Juvenile salmonid habitat. Flow type predominantly run with glide/riffle sequences and torrent. Wet width ranging from 3-5m. Depth ranging from 21-55cm. Cobble/pebble substrate with small amount of boulder. Moderate instream cover. Undercut bank both sides with vegetation rooted in riparian zone providing moderate/good bankside cover. Adjacent land is moorland heath.
River Creed (CRE08)	Trout fry: Very Poor Trout parr: Very Poor	Moderate	Moderate	-	Juvenile salmonid habitat. Flow type predominantly glide with run/pool sequences. Wet width 1-3m. Depth ranging from 21-90cm. Predominantly pebble/cobble substrate with areas of fine organic matter/silt and sand providing moderate/poor instream cover. Good bankside cover with undercut bank throughout. Adjacent land is moorland heath. Water level classed as very high.

River and Survey Location (Figure 9D)	Density Classification (Salmonids)	Habitat Utilisation Potential (Salmonids)	Habitat Quality (Salmonids)	Other Species	Summary Description (Fish Habitat)
River Creed (CRE09)	Salmon Parr: Very Poor Trout fry: Excellent Trout parr: Very Poor	Moderate	Moderate	-	Juvenile salmonid habitat. Flow type predominantly deep glide/run sequences with riffle in places. Wet width 2-4m. Depth ranging from 11-65cm. Predominantly boulder/cobble/pebble substrate with areas of fine organic matter/silt providing moderate/poor instream cover. Undercut bank providing moderate bankside cover. Adjacent land is moorland heath.
River Creed (CRE10)	Trout fry: Excellent Trout parr: Moderate	Moderate	Moderate	-	Fry (salmonid) habitat. Flow type riffle/run with a wet width ranging from 2–3m. Depth <20cm. Predominantly pebble/cobble/gravel with limited boulder. Moderate instream cover, moderate bankside cover. Collapsed dyke/weir upstream. Adjacent land is upland moorland heath. Spawning habitat in survey area.
River Creed (CRE13)	Salmon Fry: Very Poor Trout fry: Excellent Trout parr: Moderate	Moderate	Moderate	-	Fry (salmonid) habitat with Parr (salmonid) habitat in places. Flow type predominantly run with riffle/glide sequences. Wet width 2-3m. Depth ranging from 11-70cm. Predominantly gravel/pebble/cobble substrate with areas of fine organic matter/silt and sand. Limited bedrock and boulder upstream section. Moderate/poor instream cover. Good bankside cover with undercut bank throughout. Adjacent land is moorland heath.
River Creed (CRE14)	Trout fry: Excellent Trout parr: Poor	Moderate	Moderate	Eels (x2)	Juvenile salmonid habitat. Flow type predominantly run with riffle/glide sequences. Wet width ~1m. Depth ranging from <10-50 m. Predominantly gravel/pebble/cobble substrate with areas bedrock and boulder. Moderate/poor instream cover. Good bankside cover with undercut bank throughout. Discarded cattle grid recorded in mid-section. Small weir upstream – not considered to impact on fish migration. Adjacent land is moorland heath.
River Creed (CRE16)	Salmon Parr: Very Poor Trout fry: Poor Trout parr: Very Poor	Moderate	Moderate	Three-spined stickleback (x7)	Parr habitat. Flow type deep glide/run. Wet width approx. 1-3m. Depth ranging from 21-90cm. Mix of pebble/cobble/boulder substrate with areas of bedrock and gravel throughout. Moderate instream cover. Good bankside cover. Water flow was classed as very high. Adjacent land is moorland heath.

River and Survey Location (Figure 9D)	Density Classification (Salmonids)	Habitat Utilisation Potential (Salmonids)	Habitat Quality (Salmonids)	Other Species	Summary Description (Fish Habitat)
River Creed (CRE17)	Trout fry: Good Trout parr: Very Poor	Moderate	Good	Eels (x1); Three-spined stickleback (x6)	Juvenile salmonid habitat. Flow type predominantly run with riffle/glide sequences. Wet width ranging from 1.5-3m. Depth ranging from 11-50cm. Predominantly pebble/cobble substrate at the upstream section providing good instream cover. Downstream section of sand/silt substrate considered poor instream cover. Good bankside cover, with undercut bank throughout. Adjacent land is moorland heath.
Glen River (GLE01)	Trout fry: Excellent Trout parr: Good	Moderate	Good	-	Juvenile salmonid habitat. Flow type predominantly run/riffle sequences with areas of glide. Wet width ranging from 2.5-3.5m. Depth ranging from 11-55cm. Predominantly pebble/cobble/gravel substrate providing moderate instream cover. Good bankside cover, with undercut bank and draped vegetation. Adjacent land is moorland heath. Potential spawning habitat within mid-section.
Glen River (GLE02)	Trout fry: Good Trout parr: Moderate	Moderate	Moderate	Three-spined stickleback (x11)	Juvenile salmonid habitat. Flow type predominantly run/riffle sequences with areas of deep glide and pool. Wet width approx. 1-5m. Depth ranging from 11-60cm. Mix of fine organic matter/silt and sand at the downstream section caused by bank erosion. Upstream predominantly pebble/cobble/gravel substrate. Moderate/poor instream cover. Good bankside cover. Adjacent land is moorland heath.
Glen River (GLE03)	Trout fry: Good Trout parr: Moderate	Moderate	Moderate	Eels (x18)	Juvenile salmonid habitat. Flow type predominantly run/riffle sequences. Wet width ranging from 2.5-4.5m. Depth ranging from 11-50cm. Predominantly cobble/pebble/boulder substrate providing good instream cover. Moderate bankside cover. Adjacent land is moorland heath and road. Bridge footing at upstream section.
River Laxdale (LAX01)	Salmon Fry: Excellent Salmon Parr: Good Trout fry: Good Trout parr: Good	Moderate / High	Good	Eels (x3)	Juvenile & adult salmonid habitat. Flow type predominantly run/riffle/glide sequences. Wet width ranging from 8-12m. Depth ranging from 11-60cm. Predominantly cobble/pebble/gravel substrate with areas of boulder providing good/moderate instream cover. Good/moderate bankside cover with undercut bank in places. Adjacent land is moorland heath. Good spawning habitat 20m from gabion baskets.

River and Survey Location (Figure 9D)	Density Classification (Salmonids)	Habitat Utilisation Potential (Salmonids)	Habitat Quality (Salmonids)	Other Species	Summary Description (Fish Habitat)
River Laxdale (LAX02)	Trout parr: Moderate	Moderate	Moderate	Eels (x2)	Parr (salmonid) habitat. Flow type run/ glide. Wet width approx. 2.5-4m. Depth ranging from 30-90cm. Mix of cobble/boulder substrate with areas of bedrock and gravel/pebble throughout. Good instream cover. Good bankside cover. Water flow was classed as very high. Adjacent land is moorland heath.
River Tope (TOP01)	Salmon Fry: Excellent Salmon Parr: Good Trout fry: Very Poor Trout parr: Very Poor	Moderate	Moderate	Eels (x4)	Juvenile salmonid habitat. Flow type predominantly run with riffle/glide sequences. Wet width ranging from 1.5-3m. Depth ranging from 11-65cm. Predominantly boulder/bedrock with areas of cobble/pebble/gravel substrate providing moderate instream cover. Good bankside cover, with undercut bank throughout. Adjacent land is moorland heath.
River Tope (TOP02)	Salmon Fry: Very Poor Salmon Parr: Poor Trout fry: Moderate Trout parr: Moderate	Moderate	Moderate/ Good	Eels (x1)	Juvenile salmonid habitat. Flow type predominantly run with riffle/glide sequences. Wet width ranging from 2.5-4.5m. Depth ranging from 11-55cm. Substrate predominantly boulder/bedrock with areas of pebble/cobble/fine organic matter in places. Moderate, poor in places, instream cover. Instream vegetation. Good bankside cover, with undercut bank throughout. Adjacent land is moorland heath.
River Tope (TOP03)	Salmon Fry: Very Poor Salmon Parr: Very Poor Trout fry: Excellent Trout parr: Poor	Moderate	Moderate	Eels (x3)	Juvenile salmonid habitat. Flow type run/riffle/glide sequences. Wet width ranging from 2.5-4m. Depth ranging from 11-50cm. Predominantly gravel/pebble substrate with areas of cobble and fine organic matter. Limited boulder/bedrock. Moderate, poor in places, instream cover. Instream vegetation. Good bankside cover, with undercut bank throughout. Adjacent land is moorland heath.

Predicted Effects and their Significance

Obstruction of Upstream or Downstream Fish Migration (Construction)

9.17.5 Construction of watercourse crossings can lead to obstruction of upstream or downstream migration of anadromous species (including salmon, sea trout, sea lamprey and river lamprey), catadromous species (including eels) and species that do not migrate to sea but which migrate within river catchments (such as brown trout and brook lamprey), with associated adverse effects on fish spawning and recruitment.

9.17.6 The construction of watercourse crossings would take place over short/discrete sections of watercourse and the work would be of short duration. The effects on fish would be minimised through the implementation of best practice measures (**Table 9.9**).

9.17.7 The construction of watercourse crossings is therefore likely to have localised, short duration, very low magnitude effects on fish, avoiding the main period when salmonids migrate and spawn. The Proposed Development is therefore not predicted to create obstacles to migration/spawning and the effect on the conservation status of fish would be not significant.

Harm to Fish at Watercourse Crossings (Construction).

9.17.8 Work within and near the channel has the potential to harm fish, for example where a discrete section of watercourse is temporarily dammed and depleted to allow culvert installation or due to noise/vibration impulses which can harm fish. The effects on fish would be minimised through the implementation of good practice measures (**Table 9.9**).

9.17.9 These measures would mean noise/physical disturbance of fish is of short duration and very low magnitude, potentially affecting only small numbers of fish, over a small area and avoiding sensitive periods. The effect on the conservation status of fish would therefore be not significant.

Damage/Disturbance to Fish Habitats at Watercourse Crossings (Construction)

9.17.10 The construction (and decommissioning) of watercourse crossings would result in limited loss/disturbance of in-channel and bankside habitats, which can result in loss of streambed refugia, cover (all recorded species) and spawning habitat (salmonids, lamprey and stickleback). The effects on fish would be minimised through the implementation of good practice measures (**Table 9.9**).

9.17.11 These measures would mean that the connectivity of watercourse habitats is maintained and effects on fish habitats are localised, of short duration, very low magnitude and avoid spawning redds/habitats. The effects on the conservation status of fish would therefore be not significant.

Silt/Sediment and Pollutant Release to Watercourses (Construction)

9.17.12 The release of silt/sediment and or accidental pollution (e.g. oil spill from plant/equipment) can harm fish directly or damage fish habitats, for example by smothering spawning redds with silt or discharging toxic pollutants. The effects on fish would be minimised through the implementation of good practice measures (**Table 9.9**).

9.17.13 These measures would result in construction effects of sediment/pollutant release on watercourses being limited to localised loss/disturbance of river habitats and limited release of sediment at watercourse crossings, which would be localised, temporary and of short duration. This would result in a low magnitude of change and the effects on the conservation status of fish would therefore be not significant.

Silt/Sediment and Pollutant Release to Watercourses (Operation)

9.17.14 The potential risks of discharges to watercourse habitats during the operation of the Proposed Development are likely to be limited and localised, relating to planned turbine servicing works. The operator would ensure a site-specific risk assessment is completed and that control measures are implemented to ensure all environmental risks are minimised. Storage, use and disposal of oils would be in accordance with good practice and SEPA guidance (refer to **Chapter 11**). The operational effects of the Proposed Development on fish are therefore likely to be of very low magnitude and the effect on the conservation status of fish would be not significant.

Electromagnetic Emissions (Operation)

9.17.15 The effects of electromagnetic emissions from turbines and cabling on freshwater fish are not well documented, therefore the risk of effects on these species has been minimised through the iterative wind farm design process. The turbines would be over 100m from the watercourse network and cabling would extend along access tracks and hence be over 50m from the watercourse network and buried. In a limited number of instances where cables cross watercourses these would be installed on the bridge. These design measures should minimise exposure of fish to electromagnetic emissions during the operational phase. This would result in a very low magnitude of change and the effect on the conservation status of fish would be not significant.

Effects during Decommissioning

9.17.16 During the decommissioning of the Proposed Development, potential effects on fish (all recorded species) would be expected to be similar (although not necessarily of the same extent or magnitude as tracks and sub-surface infrastructure below 1m are expected to remain in situ) to those during the construction phase. Similar environmental measures as those embedded in the design/construction phase would be employed to mitigate the effects of decommissioning on fish. Any new legislation published prior to decommissioning would also be adhered to and reflected/incorporated in the environmental measures (an EMP) to be implemented during decommissioning.

9.18 Assessment Summary

9.18.1 A summary of the assessment is provided in **Table 9.14**.

9.18.2 The summary assessment below deals in an integrated way, with the effects of all phases of the Proposed Development. Potential effects are considered together as the assessment focuses on the favourable conservation status of each feature and as such, is assessed throughout the lifespan of the Proposed Development. Often changes to a feature would occur during several stages of the Proposed Development and the resultant effect may reverse during different phases. For example, during construction a population may decline, however, this effect may be reversed during operation. The summary below presents the magnitude of overall change, and whether that is adverse, beneficial or neutral.

Table 9.14 Summary of Significance of Adverse Effects

Ecological Feature	Summary of Predicted Effects (During Construction, Operation and Decommissioning)	Importance of Ecological Feature[1]	Magnitude of Change[2]	Significance[3]	Summary Rationale
Lewis Peatlands SAC - Otter	*Disturbance/displacement effects to SAC otter population*	National	Low	Not significant	The magnitude of change as a result of the Proposed Development is low in respect of the otter population that utilises the Development Site; which may be part of the Lewis Peatlands SAC population. This is on the basis of the availability of alternative resting places and foraging habitat within the wider vicinity, the temporary and sporadic nature of disturbance effects and the likelihood of complete reversibility following removal of disturbance. Sensitive design layout and the protection of watercourses, as well as the implementation of an Otter Protection Plan and other embedded measures during construction would ensure that the magnitude of any disturbance/displacement effects low and the resultant effect on the species' conservation status and SAC integrity would be not significant.
	Direct damage to resting sites and disturbance to individuals using resting sites due to elevated levels of disturbance (such as increased noise, lighting, and human presence) during construction/operation and decommissioning related works.		Low		Construction and decommissioning related disturbance/displacement effects to otters within the Development Site would be temporary and sporadic. In light of the embedded measures and the abundance of alternative suitable foraging habitat and resting sites within the Development Site, the resultant effect on the species' conservation status and SAC integrity would be not significant.
	Temporary severance of otter habitat and commuting routes		Low		Embedded mitigation would reduce the risk from the temporary loss or barrier effects during the construction of watercourse crossings and the resultant effect on the species' conservation status and SAC integrity would be not significant.
	Direct mortality due to construction related activities		Low		Embedded mitigation would reduce the risk of direct mortality to individuals during the construction and decommissioning phases and the effect on the conservation status of otter would be not significant.

Ecological Feature	Summary of Predicted Effects (During Construction, Operation and Decommissioning)	Importance of Ecological Feature[1]	Magnitude of Change[2]	Significance[3]	Summary Rationale
	Reduction in habitat quality as a result of hydrological connectivity and pollution incidents		Neutral		Embedded mitigation measures would reduce the risk from the degradation of food resource by pollution of habitats used by otter, during all phases of the Proposed Development and the resultant effect on the species' conservation status and SAC integrity would be not significant.
Tong Saltings SSSI	*Habitat damage due to silt release and pollution during construction, operation and decommissioning*	Local	Low	Not significant	The effects on the River Laxdale (the potential effects pathway) would be limited to localised loss/disturbance of river habitats during installation of culverts and limited release of sediment at watercourse crossings. Through the implementation of embedded measures, the Proposed Development is anticipated to cause temporary (short term) change to the local hydrology regime (low magnitude), with negligible effects to the interest features of the SSSI, which would not alter the integrity of the Site.
Blanket bog communities	*Direct loss and temporary disturbance of blanket bog habitats due to land take associated with the construction of site infrastructure*	National	Medium	**Significant**	The Proposed Development is predicted to result in the combined loss (30.5ha) or temporary disturbance (77.7ha) of 108.2 ha of blanket bog, which equates to 7.8% of the resource within the Development Site, however less than 3% of the most sensitive habitat would be affected. Direct loss and temporary disturbance of sensitive blanket bog habitats during construction activities is anticipated to be of a medium scale of magnitude in the short to medium term and this would have a **significant** effect on the conservation status of blanket bog. Some vegetation recovery within the disturbed areas would be expected in the medium to longer term.
	Indirect disturbance and changes to composition of plant communities resulting from hydrological change		Low	Not Significant	The Proposed Development is anticipated to cause temporary (medium term) change to the local hydrology regime (low magnitude), with some potential change in the composition of vegetation. However, the effect on the conservation status of blanket bog would be not significant.

Ecological Feature	Summary of Predicted Effects (During Construction, Operation and Decommissioning)	Importance of Ecological Feature[1]	Magnitude of Change[2]	Significance[3]	Summary Rationale
Wet heath communities	*Permanent loss of wet heath habitat due to land take associated with the construction of site infrastructure*	Regional	Medium	**Significant**	The Proposed Development is predicted to result in the combined loss (2.4ha) and temporary disturbance (1.3ha) of 3.7ha wet heath, which equates to 11.6% of the wet heath resource within the Development Site. Direct loss and temporary disturbance of wet heath during construction activities is anticipated to be of a medium scale of magnitude in the short to medium term and this would have a **significant** effect on the conservation status of wet heath. Some vegetation recovery within the disturbed areas would be expected in the medium term.
	Indirect disturbance and changes to composition of plant communities resulting from hydrological change		Low	Not Significant	The Proposed Development is anticipated to cause temporary (medium term) change to the local hydrology regime (low magnitude), with some potential localised change in the composition of vegetation. However, the effect on the conservation status of wet heath would be not significant.
Dry heath communities	*Indirect disturbance and changes to composition of plant communities resulting from hydrological change*	Regional	Low	Not Significant	The Proposed Development is anticipated to cause temporary (medium term) change to the local hydrology regime (low magnitude), with some potential localised change in the composition of vegetation. However, the effect on the conservation status of dry heath would be not significant.
Marshy grassland, rush pasture communities	*Permanent loss of marshy grassland due to land take associated with the construction of site infrastructure*	County	Low	Not Significant	The Proposed Development is predicted to result in the combined direct loss and temporary disturbance of 0.17ha, comprising 0.17% of the on-site resource; and an additional 0.14 ha of temporarily disturbance habitat, comprising 0.78% of the on-site resource. These areas combined equate to <1% of the marshy grassland resource within the Proposed Development site. Direct loss and temporary disturbance of marshy grassland during construction activities is anticipated to be of a low scale of magnitude. Effects on the conservation status of marshy grassland/rush pasture would be not significant.

Ecological Feature	Summary of Predicted Effects (During Construction, Operation and Decommissioning)	Importance of Ecological Feature[1]	Magnitude of Change[2]	Significance[3]	Summary Rationale
	Indirect disturbance and changes to composition of plant communities resulting from hydrological change		Low	Not Significant	The Proposed Development is anticipated to cause temporary change in the medium term to the local hydrology regime at low magnitude, with some potential change in the composition of vegetation. However, the effect on the conservation status of marshy grassland would be not significant.
Waterbodies (Rivers and Lochs	*Habitat damage due to silt release and pollution during construction, operation and decommissioning*	National	Low	Not Significant	The effects on waterbodies would be limited to localised loss/disturbance of river habitats during installation of culverts and limited release of sediment at watercourse crossings. These would be localised, temporary and of short duration. They would not alter the conservation status of waterbodies (rivers and lochs) and would be not significant.
Atlantic salmon, sea trout, brown trout and Eel	*Population declines due to obstruction to migration/spawning, habitat degradation and physical harm.*	Regional	Very Low	Not Significant	Embedded mitigation measures would reduce the risk of effects on these species due to the construction of watercourse crossings, with the effects being localised and of short duration, avoiding the main period when salmonids migrate and spawn. The Proposed Development would not create obstacles to migration/spawning and the effects on these fish species would be not significant.
Sea Lamprey, River Lamprey, Brook lamprey	*Population declines due to obstruction to migration/spawning, habitat degradation and physical harm.*	Local	Very Low	Not Significant	Lampreys were not recorded within the Development Site during the 2010 or 2018 surveys, therefore effects on these species are unlikely. The measures to mitigate effects on salmonids would also limit the risk of effects on these species should they migrate into watercourses that cross the Development Site prior to construction.
Three-spined stickleback	*Population declines due to habitat degradation and physical harm.*	Local	Very Low	Not Significant	Three-spined stickleback are common and widespread and the measures to mitigate effects on salmonids would further minimise effects on this species.

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Ecological Feature	Summary of Predicted Effects (During Construction, Operation and Decommissioning)	Importance of Ecological Feature[1]	Magnitude of Change[2]	Significance[3]	Summary Rationale
Freshwater pearl mussel	*Population declines to habitat disturbance and habitat degradation (siltation/pollution)*	Local	Very Low	Not Significant	Freshwater pearl mussels have not been recorded within the Development Site and are unlikely to be affected by the Proposed Development. The measures to mitigate effects on salmonids would also protect this species should they be present within the catchments of watercourses that cross the Development Site.

1. The importance of the feature is defined as per **Table 9.7**, **Section 9.7**, using the criteria set out in **Table 9.7**, and method in **Section 9.7**.
2. The magnitude of change on a receptor resulting from activities relating to the development is defined using the criteria set out in **Section 9.9**, **Table 9.10** above and is defined as neutral, very low, low, medium, and high.
3. The significance of the environmental effects is either significant or not significant subject to the evaluation methodology outlined in **Section 9.9**.

9.19 Assessment of Cumulative Effects

9.19.1 As outlined in **Section 4.8**, consideration has been given as to whether any of the ecological features that have been taken forward for assessment in this chapter are likely to be subject to cumulative effects on ecological features because of the effects generated by other developments.

9.19.2 With embedded measures (**Section 9.8**), any effects on habitats due to the Proposed Development are not anticipated to extend beyond the Development Site. However, the potential for cumulative effects needs to be considered in respect of designated sites, habitats and fauna identified as ecological features in this chapter, in particular, aquatic ecology features (given the pathway via watercourses to off-site features) and highly mobile species such as otter.

9.19.3 This cumulative assessment comprises all developments within the spatial area within a 32km radius of the Proposed Development including wind farms (consented and in planning). This is based upon the range of a dog otter (see **Table 9.8**). In total, four other wind energy developments are included in the assessment as listed in **Table 9.15** (and illustrated in **Figure 6.8**,).

Table 9.15 Wind Energy Development Included in Ecology Cumulative Impact Assessment

Wind Farm Site	Approximate Distance from the Proposed Development (km)	Status	Number (and tip height) of Proposed Turbine	Important Ecological Features	Predicted Residual Impacts on Ecological Features
Muaitheabhal (Beinn Mhor)	16.6	Consented	33 turbines 145m	Blanket bog, Otter, and Freshwater fishes	No information available in the public domain.
Druim Leathann	16.6	Consented	14 turbines 126.5m	Blanket bog, Otter, and Freshwater fishes	A **significant** impact on blanket bog and related habitats is predicted due to the direct loss of approximately 12.4ha and indirect impacts on approximately 22.8ha. No predicted residual impacts on other ecological features.
Muaitheabhal (East Extension)	17	Consented	6 turbines 150m	Blanket bog, wet heath Otter, and Freshwater fishes	Residual minor negative impacts on fisheries, otter and streams and rivers during the construction phase, and residual impacts of moderate significance on blanket bog and wet dwarf shrub heath. During the operational phase all impacts will be of either minor or negligible significance.
Muaitheabhal (South Extension)	20.1	Consented	6 turbines 150m/ 130m	Blanket bog, Otter, and Freshwater fishes	The assessment concludes that effects on otter and fisheries would be not **significant** at any level. However, impacts on blanket bog and wet heath habitats are largely as a result of the extent of habitat loss, and therefore, despite mitigation, **significant** negative impacts to wet heath and blanket bog remain, albeit at the Site level only.

*Note: The three Muaitheabhal wind farms are collectively known as the Uisenis Wind Farm.

9.19.4 Given the predicted significant effects on blanket bog habitat anticipated within the Development Site, as well as Druim Leathann, Muaitheabhal (East Extension) and Muaitheabhal (South Extension), cumulatively the loss and disturbance to blanket bog habitat in the context of the blanket bog resource within Lewis and Harris could be **significant**. However, provided each scheme implemented a reinstatement/ restoration plan, vegetation recovery within the disturbed areas would be expected in the medium to longer term. Compensatory habitat management measure could also reduce potential impacts, although details are unknown for these other cumulative sites.

9.19.5 Given the extensive home ranges of otters (up to 35km of watercourse for males; and overlapping territories with females), the otter(s) which use the Development Site could potentially be the same individuals as are reported to be using the watercourses within the Muaitheabhal and Druim Leathann sites. However, given the extent of available foraging and resting site habitat within each of these sites, the risk of increased disturbance/displacement and severance of habitats, given the proposed embedded measures described in **Section 9.8** would be limited. The Proposed Development is likely to have only localised, temporary effects on otter that are of low magnitude and short duration and are likely to be not significant. The Proposed Development is also likely to have no significant effects on the SAC otter population in combination with other developments or activities.

9.19.6 The Proposed Development is likely to have only localised, temporary effects on rivers/lochs, fish and freshwater invertebrates that are of very low magnitude and short duration and are likely to be not significant. The Proposed Development is also likely to have no significant effects on these ecological features in combination with other developments or activities.

9.19.7 In summary, given the **significant** effects to blanket bog and wet heath communities as a result of the Proposed Development and at each of the above schemes (where assessment is available), **significant** cumulative effects are possible in combination with the above schemes.

9.20 Consideration of Optional Additional Mitigation or Compensation

9.20.1 There is the potential for **significant** adverse impacts arising from construction works to sensitive habitats (in particular active blanket bog and wet heath). The following outlines additional mitigation and compensation measures proposed to address these effects.

Habitat Reinstatement and Compensatory Habitat Restoration

9.20.2 Habitat re-instatement would take place alongside cut roads, alongside cranepads and substation, within the borrow pit and on temporary compounds and lay down areas. There is therefore potential for up to 70% of the habitat disturbed for construction to be reinstated in the Development Site in the medium term (10 to 20 years) following construction activities. This re-instatement would be informed by further surveys prior to reinstatement and future site monitoring, as outlined in **Appendix 9H**.

9.20.3 Consideration has been given to the possibility of removing plantation forestry that has been planted on blanket bog and implementing habitat management measures such as ditch blocking which would raise the water table and restore hydrological function for the benefit of the mire communities. The reason for this is that plantation forestry on this habitat does not meet with the principles of sustainable forest management and Scotland's Forestry Strategy 2019-2029[14] states that the impacts of inappropriate tree planting on deep peat should be addressed to meet the UK Forestry Standard. The trees that have been planted within the Development Site are generally in poor condition with many being stunted, diseased or dead. However, surveys have found that the forested areas are of critical importance for hen harrier (see **Chapter 8**) and removal of forestry for the benefit of blanket bog has therefore been discounted.

[14] https://www.gov.scot/publications/scotlands-forestry-strategy-20192029/pages/6/

9.20.4 Blanket bog habitats elsewhere within the Development Site consist of a range of mire communities which are in good condition and peat is likely to be actively forming throughout, probably even within old peat cuttings. As a result, it is considered that there is no possibility of undertaking habitat management within the Development Site which would compensate for the loss of important habitats.

9.20.5 **Appendix 9I: Outline Habitat Management Plan** sets out criteria for identifying and delivering compensatory blanket bog habitat management offsite. The Outline Habitat Management Plan (OHMP) also sets out proposal for small scale native tree planting within the Development Site and criteria for identifying and managing rush pasture and woodland habitats offsite for the benefit of hen harrier.

9.20.6 All habitat restoration proposals would be following consultation with SNH.

Woodland Removal Policy

9.20.7 In accordance with the UK Forestry Standard (UKFS) and The Scottish Government's Policy on Control of Woodland Removal, compensatory tree planting would normally be carried out to fully offset loss of coniferous plantation woodland within the Development Site (in this case 41.1ha).

9.20.8 However, in addition to the woodland within the Development Site, there have been failed attempts to establish forest plantation elsewhere on the island (for example planting at Druim an Laga). This is largely due to the environmental conditions which are generally unsuitable for plantation forestry due to the waterlogged nature of the underlying peat and the lack of nutrients. It is expected that any such planting that may be proposed on the island would not meet the criteria for sustainable forest management as set out within the UK Forestry Standard[14].

9.20.9 It is not therefore proposed to carry out replanting to this scale. Tree planting would instead be carried out in discrete areas where this would be ecologically beneficial and, importantly, where the trees should be able to establish and grow successfully.

9.20.10 The principles for such planting are set out in **Appendix 9I**. Trees planted would be of native species, and planting proposals would be subject to consultation with SNH and FCS prior to commencing.

9.21 Conclusions of Significance Evaluation

9.21.1 The habitat loss of blanket bog and wet heath within the footprint of the Proposed Development is considered to be a **significant** effect. However, the OHMP (**Appendix 9I**) sets out criteria for identifying and delivering compensatory habitat management offsite which would compensate for the area of blanket bog/wet heath (approximately 33ha) that would be permanently lost due to the Proposed Development. This would reduce the residual effect of habitat loss to not significant.

9.22 Implementation of Environmental Measures

9.22.1 **Table 9.16** describes the environmental measures embedded within the Proposed Development and the mechanism by which they would be implemented (e.g. planning condition) and who is responsible for their implementation.

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Table 9.16 Summary of Environmental Measures Relevant to Ecology

Environmental Measure	Responsibility for Implementation	Compliance Mechanism
CONSTRUCTION		
Preparation of Habitat Management Plan as part of the Construction Environmental Management Plan (EMP)	Developer	Planning condition
Preparation of Tree Removal Plan	Developer	Planning condition
Preparation of Otter Species Protection Plan	Developer	Planning condition
Preparation of reinstatement and restoration plan	Developer	Planning condition
Tool box talks	Construction Manager and ECoW.	CEMP
Adherence to Pollution Prevention Plan as fully detailed in **Chapter 11**.	Construction Manager and ECoW.	Planning condition
Watercourse exclusion zones (50m buffers) and restrictions on timing of works within these zones implemented through the CEMP	Developer/Contractor	Planning condition
Bottomless culvert and bridge designs and construction in accordance with SEPA good practice. Construction/installation and monitoring requirements implemented via the CEMP	Developer/Contractor	Planning condition
Measures to control silt/sediment and pollution and limit noise emissions implemented through the CEMP, Water Management Plan, Peat Management Plan and Pollution Prevention Plan.	Developer/Contractor	Planning condition
Monitoring of effects on freshwater ecology to be set out in an Environmental Monitoring Plan (fish, freshwater invertebrates and water quality and river habitats) and implemented.	Developer/Contractor	Planning condition
OPERATION PHASE		
Water quality protection measures (e.g. adherence to SEPA PPGs).	Developer and ECoW	Planning condition
All maintenance working areas would be clearly defined.	Developer and ECoW	Planning condition
Pollution risk due to operational activities including servicing and maintenance to be minimised through operator risk assessments and appropriate preventative measures	Developer/Operator	CAR License
Monitoring of effects on freshwater ecology through an Environmental Monitoring Plan (fish, freshwater invertebrates and water quality).	Developer	Planning condition
DECOMMISSIONING		
Preparation of a Restoration and Decommissioning Plan.	Developer	Planning condition
Watercourse exclusion zones (50m buffers) and restrictions on timing of works within these zones implemented through the CEMP.	Developer/Contractor	Planning condition

Environmental Measure	Responsibility for Implementation	Compliance Mechanism
Measures to control silt/sediment and pollution release and limit noise incorporated into the CEMP, Water Management Plan, Peat Management Plan and Pollution Prevention Plan	Developer/Contractor	Planning condition
Monitoring of effects on freshwater ecology through an Environmental Monitoring Plan (fish, freshwater invertebrates and water quality).	Developer/Contractor	Planning condition

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10. Telecommunications and Aviation

Non-Technical Summary

Infrastructure, telecommunications and aviation are not technically environmental issues, however for completeness, a chapter has been included in the EIA Report. It addresses the potential impact of the Proposed Development on telecommunications, infrastructure and aviation interests.

Consultation has been carried out with organisations that own or operate infrastructure on or close to the Development Site. The results have shown that there are some utility infrastructure and communications links within the Development Site (electricity, water, telecommunications) that could be affected by the Proposed Development. The design process undertaken for the Proposed Development has ensured that wherever possible, the proposed turbines are located in areas where there would be no effects on infrastructure or telecommunications interests. Where this has not been possible, mitigation measures would be implemented so that these services would not be affected by the Proposed Development.

Consultation has been carried out with organisations that own or operate communications infrastructure. NATS En-Route Ltd has indicated that the proposal would conflict with current safeguarding criteria. As a result, is objecting to the Proposed Development due risk to operation of 2 links between Sandwick and Eitshal. Discussions are ongoing with NATS to mitigate the effects on the communications infrastructure.

The Ministry of Defence has not indicated that turbines would be visible to its Air Defence Radar infrastructure. Separate survey has confirmed that turbines would not be visible to Air Defence Radars in the region. The main safeguarding concern of the Ministry of Defence with respect to turbines is their potential to create a physical obstruction to air traffic movements and this can be satisfactorily resolved with the requirement for lighting in line with the UK Air Navigation Order and Regulations (2016) and Civil Aviation Authority Policy on aviation lighting and an assessment of lighting is included in Appendix 6D of the EIA Report.

Highlands and Islands Airports Ltd has indicated that Proposed Development falls inside the safeguarded areas for Stornoway Airport. Discussions are ongoing with the airport in terms of potential effects on their infrastructure. This includes changes to the flight paths for take off and landing for the airport and aviation lighting. The landscape and visual impact assessment included with this EIA Report has assessed worst case scenario in terms of aviation lighting.

In terms of the Met Office radar on the Isle of Lewis, the mitigation was previously agreed under the Consented Development scheme, i.e. the re-location of the Met Office Radar. It is considered that this previously agreed mitigation is sufficient to ensure the revised scheme would have no unacceptable effects on Met Office operation on the Island.

10.1 Introduction and Overview

10.1.1 This chapter, which should be read with reference to the scheme description in **Chapter 4: Description of the Proposed Development**, considers the potential effects of the Proposed Development on infrastructure, telecommunications, and aviation issues. These matters have been investigated through consultation with the relevant system operators and accounted for in the iterative wind farm design process.

10.1.2 The design process is described in **Chapter 3: Scheme need, alternative and iterative design process**. **Figure 3.1** (Constraints) and **Figure 3.2** (design evolution), illustrates that wherever possible, turbines are located in areas where there would be no effects on existing infrastructure, telecommunications, and aviation interests. Where this is not possible, discussions with relevant operators are on-going and an agreement would be reached for alternative arrangements to be made so that existing services would not be affected by the Proposed Development.

10.1.3 Following a summary of relevant policy and legislation, this Chapter describes the assessment methodology that has been adopted, the overall baseline conditions and how the design of the Proposed Development has evolved to reduce potential effects (embedded mitigation). The Chapter then provides a summary of the aviation bodies that have been consulted and their responses and provides a summary of environmental measures (additional mitigation) to avoid, minimise, mitigate or compensate for adverse effects. The Chapter concludes with a summary of residual effects following the incorporation of these environmental measures into the scheme.

10.1.4 The infrastructure and telecommunications element of the Chapter has been prepared by Wood, and the aviation aspects have been prepared by Osprey Consulting Services Ltd (Osprey). A list of relevant terminology and abbreviations used in the Chapter are presented in **Appendix 1A.**

10.2 Methodology and Approach

Policy and Legislation

Scottish Planning Policy and Advice

10.2.1 The Scottish Government's Online Renewables Planning Advice: Onshore Wind (updated May 2014) states that: "Wind turbines (in common with all electrical equipment) produce electro-magnetic radiation which can interfere with broadcast communications and signals. The Radiocommunications Agency (RA) register of all civil radio communications installations in the UK can identify any radio installations in the neighbourhood of a wind farm site, but will not identify their owners. Applicants should make direct contact with any authorities or bodies likely to have an interest, in particular, the local emergency services, local authority services departments, gas and electricity companies".

10.2.2 In addition, the Online Renewables Planning Advice states that: "depending on the wind turbine and anemometers' size, shape, construction materials and location, together with the amount of electromagnetic interference, there may be implications for airport radar and communications systems. Planning authorities should consult the MOD and NERL who have a statutory duty to safeguard certain communication, navigation and surveillance (CNS) sites (including radars) from interference to signals caused by wind turbines in the interests of national security, and the continued safe operation of passenger and military aviation".

Planning Circular 2/2003 Safeguarding of Aerodromes, Technical Sites and Military Explosive Storage Areas

10.2.3 Planning Circular 2/2003 (revised) sets out criteria outlining how planning authorities must consult with aviation Consultees and which processes they must follow in order to ensure that Consultee responses to proposals are taken into account.

Outer Hebrides Local Development Plan

10.2.4 Details of the planning policy are set out in **Chapter 5: Legislation and policy overview**. Adopted Local Plan Policy EI 8 relates to renewable energy, and makes provision for aviation, radar, telecommunications and infrastructure interests:

"Development proposals for all scales of onshore wind energy development will be assessed against the Supplementary Guidance for Wind Energy Development. The Comhairle supports the principle of wind farm development in Areas with Potential for Wind Farms subject to a satisfactory assessment

against other policies in this plan and the Supplementary Guidance. Many of these areas, particularly in the Uists, will however be constrained by MOD radar. The Supplementary Guidance will give further details of the radar constraints. The Comhairle will also consider wind farm development in Areas of Constraint, with potential in certain circumstances (Map 1)subject to a satisfactory assessment against other policies in this plan and the Supplementary Guidance………

….Proposals for all other renewable energy projects and oil and gas operations (including land based infrastructure associated with offshore projects) will be required to demonstrate all the following:

a. *appropriate location, siting and design including the technical rationale for the choice of site;*

b. *no significant adverse impact (including cumulative) on: landscape, townscape and visual aspects; natural, built and cultural heritage resources; the water environment; peatlands; aviation, defence and telecommunications transmitting and receiving systems, e.g., broadband; public health and safety, and amenity (including noise); neighbouring land uses, transport management and core paths;….."*

10.2.5 Additional guidance is provided for developers with regards to community amenity in the Outer Hebrides Local Development Plan Supplementary Guidance:

"Planning applications for wind farms must be accompanied by evidence that the proposals have been assessed and found to have no unacceptable significant adverse impact on community amenity in relation to the following:

- *Shadow flicker; noise (also see separate policy);*
- *Electromagnetic interference;*
- *Commissioning and decommissioning;*
- *Phasing;*
- *Ancillary developments and infrastructure;*
- *Public access;*
- *Cumulative impacts of the above, including noise, cumulative development assessment, and neighbouring development."*

10.2.6 Further guidance is provided for developers with regards to aviation and defence:

"All applications (in Uist in particular) pre-application discussion with the Comhairle Planning Service and the Ministry of Defence (MOD) is advised, to identify any potential aviation and/or defence constraint arising in relation to radar.

The impacts of developments on aviation and defence operations must be satisfactorily addressed and developers must demonstrate that aviation, defence and emergency services operations will not be compromised. This includes flight activity, navigation and surveillance systems and other air safety navigation, test or surveillance assets or systems.

Consultation with: Highlands & Islands Airports Limited; the Ministry of Defence; National Air Traffic Services; Maritime and Coastguard Agency and the Comhairle should take place at the relevant stages.

When designing and siting proposals Developers should pay particular regard to:

- *MOD Safeguarding Areas;*
- *Health & Safety Executive Safeguarding Zones;*

- *NATS (En Route) Plc (NERL) Safeguarding Maps;*
- *Department of Trade and Industry "Wind Energy and Aviation Interest – Interim Guidance";*
- *CAP 764 - CAA Policy and Guidelines on Wind Turbines - Civil Aviation Authority February 2016;*
- *CAP 393 – Air Navigation: The Order and the Regulations Civil Aviation Authority April 2015;*
- *CAP 670 – Air Traffic Services Safety Requirements Part B Gen 01 Wind Farms Civil Aviation Authority May 2014;*
- *Visibility to NATS, HIAL, and MOD radar and installations;*
- *The Ministry of Defence has provided the Comhairle with bespoke maps for wind turbine visibility to MOD radar in the Outer Hebrides (Maps 3a – e)."*

Civil Aviation Authority (CAA) Guidance

10.2.7 The CAA has produced/commissioned a series of publications referred to as CAPs and those of relevance to wind farms are summarised below in **Table 10.1**.

Table 10.1 Summary of CAPs Relevant to Wind Farms

Policy Reference	Policy Issue
CAP 168 – Licensing of Aerodromes	Chapter 4 – The Assessment and Treatment of Obstacles, Paragraph 1.1, states: *"The effective utilisation of an aerodrome may be considerably influenced by natural features and man-made constructions inside and outside its boundary. These may result in limitations on the distance available for take-off and landing and on the range of meteorological conditions in which take-off and landing can be undertaken. For these reasons certain areas of the local airspace must be regarded as integral parts of the aerodrome environment. The degree of freedom from obstacles in these areas is as important to the granting and retention of an aerodrome license as the more obvious physical requirements of the runways and their associated runways strips".*
CAP 670 – Air Traffic Services Safety Requirements	Part B, Section 4, GEN 01, sub-section 3: *"Windfarms need to be considered as a safeguarding activity. The ATS [Air Traffic Service] Provider is responsible for ensuring, as far as is reasonably practicable, that such development does not impact on the safety of the ATS environment.* *The ATS Provider is responsible for deciding whether or not it can accept any degradation to the ATS environment. If the ATS Provider predicts that the degradation is unacceptable then it should make representations to the appropriate local Authority.* *The CAA does not have the power to veto Windfarm development (other than on the land actually owned by the CAA).* *The ATS provider is responsible for mitigating against any deterioration to the Air traffic Services caused by wind farms".*
CAP 738 – Safeguarding of Aerodromes	Chapter 1 – Safeguarding of Aerodromes, Paragraph 1.1, states: *"A process of consultation between a Local Planning Authority (LPA) and consultees, which is made obligatory by Statutory Direction, safeguards some aerodromes and aeronautical technical sites in the United Kingdom. This is called 'statutory' or 'official' safeguarding".*

Policy Reference	Policy Issue
CAP 764 – CAA Policy and Guidelines on Wind Turbines	Chapter 3 – Safeguarding Considerations, Paragraph 1a, states: "*Developers will be referred to the aerodrome licensee of aerodromes with a surveillance radar facility within 30km of the proposed wind turbine development or to the distance specified by the aerodrome or indicated on the aerodromes published wind turbine consultation map*".

Baseline Establishment

10.2.8 The infrastructure, aviation, and telecommunications assessment is largely based on consultation with the organisations known to have interests in the area of the Development Site.

Consultation

10.2.9 A series of consultation exercises to identify utility, infrastructure, aviation and telecommunications service providers in the area of the Development Site were carried out to inform the EIA for the Proposed Development. The result of these consultations are summarised as part of the baseline information presented in **Section 10.3**.

Methodology for Establishment of Effects and Evaluation Methodology

10.2.10 It is not intended to ascribe an evaluation methodology in relation to the issues described in this Chapter as the approach when considering telecommunications, infrastructure and aviation issues is to design a wind farm to avoid potential impacts on these interests wherever possible. Where relocation of turbines or associated wind farm infrastructure to avoid potential impacts is not possible, technical solutions to address these are then identified to ensure that there is no disruption to the operations of the service providers.

10.3 Baseline

Current Baseline

Infrastructure

10.3.1 Consultation commenced in January 2018 onwards, to build on the work undertaken as part of the Consented Development and responses received in relation to the Scoping Opinion for the Proposed Development. Infrastructure consultations are summarised in **Table 10.2**, and **Figure 10.1** shows all relevant infrastructure and applied buffers.

Table 10.2 Summary of Issues Raised during Consultation Regarding Infrastructure

Consultee/Data Provider	Response
LinesearchbeforeUdig (LSBUD)	Details of the Proposed Development were entered into http://www.linesearchbeforeudig.co.uk. SGN was identified as potentially having infrastructure in the vicinity of the Development Site.
Scottish and Southern Energy (trading as Scottish Hydro Electric Power Distribution (SHEPD) in Northern Scotland)	SHEPD online infrastructure search shows that there are a number of 11kV, 33kV and 132kV power lines running across or close to the Development Site. The majority of this infrastructure is located to the east / south east of the Development Site, generally running along the A858. Beinn Greidaig Wind Farm has a cable that runs through the centre of the Development Site along the minor road in the middle of the Development Site before running down towards the Marybank substation.
SGN	LSBUD identified SGN as potentially having assets in the vicinity of the site. SGN subsequently provided mapping showing there were no assets that would be affected by the Proposed Development.
Scottish Water (SW)	Scottish Water responded to scoping with the following statement: *"According to our records, the development proposals impact on existing Scottish Water assets.* *The applicant should be aware that any conflict with assets identified may be subject to restrictions on proximity of construction."* SW Asset maps were obtained that showed that the wind turbines would not affect Scottish Water infrastructure, but some of the access points to the Development Site would need to locate and protect the SW assets, if required, before construction takes place.

Telecommunications

10.3.2 Consultation relating to telecommunications commenced in April 2018 onwards, to build on the work undertaken as part of the Consented Development and responses received in relation to the Scoping Opinion for the Proposed Development. A summary of telecommunications consultations is provided in **Table 10.3.**

Table 10.3 Summary of Issues Raised during Consultation Regarding Telecommunications

Issue Raised	Consultee(s)	Response
Microwave Links	Ofcom	A number of microwave links were identified near to the Development Site; the operators identified are: • Highlands and Islands Enterprise; • BT; • EE Limited (MBNL); • Airwave Solutions Limited; • Vodafone. These operators were then contacted individually to obtain more detailed information.
Microwave Links	JRC	Objected to development due to three scanning telemetry and one microwave link crossing the Development Site. A coordination study was commissioned which looked at the Proposed Development in more detail and the linked locations were identified.

Issue Raised	Consultee(s)	Response
Microwave Links	Airwave Solution	Objected to the Proposed Development due to two microwave links crossing the Development Site. A coordination study was commissioned which looked at the Proposed Development in more detail and the linked locations were identified.
Microwave Links	BT	Objected to the Proposed Development and provided details of the two BT microwave links crossing the Development Site.
Microwave Links	EE (MBNL)	MBNL provided details of the link that crosses the Development Site, along with its requested buffers.
Microwave Links	Vodafone	No response has been received from Vodafone.
Microwave Links	Highlands and Islands Enterprise	Provided details of the link that crosses the Development Site.
Microwave Links	NATS	Although not identified by Ofcom, NATS responded to a separate consultation request identifying two microwave links running across the Development Site (using the same path). NATS also identified a potential impact on air-ground communications but deemed it acceptable.
Telecommunications	TV Signal	A number of properties to the north and east of the Development Site are within 5km of the Proposed Development, and as such might have television reception affected. The nearest digital broadcast mast is Eitshal, located to the south west of the Development Site, and therefore parts of the Proposed Development lies between the broadcast tower and the population centre.

Aviation

10.3.3 A summary of Aviation consultations is provided in **Table 10.4.**

Table 10.4 Summary of Issues Raised during Consultation Regarding Aviation and Radar

Consultee	Response
Ministry of Defence (MOD)	The MOD has no objection to the Proposed Development. In the interests of aviation safety the MOD requests that the cardinal turbines (turbines 1, 8, 10, 16 and 20) are fitted with MOD accredited combination 25 candela omni-directional red lighting and infrared lighting with an optimised flash pattern of 60 flashes per minute of 200ms to 500ms duration at the highest practical point. The remaining perimeter turbines should be fitted with 25 candela omni-directional lighting or infrared lighting to the same specification as previously stated. The principal concern of the MOD with respect of the development of wind turbines relates to their potential to create a physical obstruction to air traffic movements and cause interference to Air Traffic Control and Air Defence radar installations.
NATS En Route PLC (NATS)	Based on their preliminary technical findings, the Proposed Development was found to conflict with their safeguarding criteria. Accordingly, NATS objected to the proposal. Following further examination, technical and operational safeguarding teams deemed the potential impact on air-ground communications to be acceptable. However the risk to the operation of two microwave links was found to be sufficient for NATS to **object** to the Proposed Development.

Consultee	Response
Highlands and Islands Airports Ltd (HIAL)	The Proposed Development falls inside the safeguarded areas for Stornoway Airport. The turbines would present a significant infringement to the safeguarded area. The Civil Aviation Authority (CAA) expects HIAL to provide evidence that the safety of Air Traffic Service Provision would not be compromised or degraded by the development and a safety case / full assessment would need to be submitted to them. This process was undertaken for the previous consent to the windfarm. However, due to the change in layout and significant increase in turbine height, a separate safety case would be required. Due to the height of the Proposed Development, as a minimum, aviation warning lights of 2000 candela would be required at the hub height of all turbines. It should be noted that HIAL would work with the developer towards a resolution. However, HIAL would **object** to this proposal until a conclusion can be reached with the CAA.
Met Office	No Response.
Civil Aviation Authority (CAA)	No Response.

Predicted Future Baseline

10.3.4 On the basis of the consultation undertaken, there are no additional planned utility infrastructure, aviation or telecommunications developments in the vicinity of the Development Site. If the Proposed Development is consented and built, any future developments would be required to take account of the presence of the wind farm in the implementation.

Information Gaps

10.3.5 Vodafone have not responded to consultation and it is assumed that it has no links that could be affected by the Proposed Development.

10.3.6 Joint Radio Company (JRC) have been consulted on the layout as presented in **Figure 4.1** and are currently modelling the application layout, but have not provided their response to date.

10.3.7 The Met Office have not responded to the consultation. For the purposes of this Chapter it is assumed that the mitigation agreed under the Consented Development scheme, i.e. the re-location of the Met Office Radar, is sufficient to ensure the revised scheme would have no unacceptable effects on Met office operation on the Island.

10.3.8 On this basis, no information gaps that would affect the robustness of this assessment have been identified.

10.4 Design Evolution

10.4.1 As a general principle, wind farms are designed with due cognisance of telecommunication links and other elements of infrastructure that cross development sites, based on the consultation responses from relevant organisations. This iterative design process is set out in **Chapter 3** and **Figure 10.1** identifies the constraints that have been used to help inform the wind farm design.

Infrastructure

10.4.2 11kV, 33kV and 132kV pole mounted above ground electric power lines, operated by SHEPD, run along the A859 to the south east and east of the proposed turbine locations. The proposed turbines are a minimum of 900m from the power lines and no effects are anticipated as a result of the Proposed Development.

10.4.3 The SHEDP 33kV pole mounted power lines that runs north-south between the recycling plant and the SHEPD substation near Creed Bridge, and the 11kV, 33kV and 132kV lines that run parallel to the A859 could potentially be affected by track construction work. Any suitable protection works identified with the operator would therefore be put in place before any construction work begins.

10.4.4 Depending on the clearance under the power line, it is likely that some undergrounding of the SHEPD infrastructure would be required in order to allow abnormal load vehicles delivering turbines and other components to pass.

10.4.5 With regards to the underground electrical cables connecting Beinn Greidaig Wind Farm to the electrical network that could potentially be affected by track construction work, buried power line locations would be identified before any construction work begins, and any suitable protection works identified with the operator and put in place if required.

Telecommunications

10.4.6 JRC identified three scanning telemetry links, and one fixed microwave link running across the Development Site, and so objected initially to the Proposed Development (which is standard practice for JRC if any links are identified within 1km of a turbine location).

10.4.7 The Applicant subsequently commissioned a coordination study with JRC to establish the location of the links and the impact on its network. This study used the scoping layout, and JRC requested that a number of turbines be moved and/or micrositing be limited in a certain direction in order to establish acceptable impacts on its network. Working with these details, a suitable buffer distance was established and used in redesigning the Proposed Development under the design process described in **Chapter 3**.

10.4.8 One of the scanning telemetry links relates to the Pentland Road Wind Farm communication array. This link originates close to a number of the proposed turbine locations and runs through the location of turbine 21.

10.4.9 Due to the complex nature of scanning telemetry links, the Proposed Development was sent to JRC for final comment, but no response has been received to date.

10.4.10 Airwave Solutions identified two links running across the Development Site. A detailed study was commissioned to identify the locations and establish appropriate stand-off buffers, again using the scoping layout. Airwaves requested that 100m from the link centre point to the turbine centre point be used as a minimum buffer. Based on the layout of the Proposed Development (**Figure 4.1**), all turbines are in excess of 160m from the nearest link.

10.4.11 BT identified two microwave links running across the site and also provided link details. An initial buffer of 100m from blade tip was requested as standard, although in the past BT have been able to accept a much smaller buffer of 25m from the edge of the 2nd Fresnel Zone to the blade tip of any turbine.

10.4.12 Based on the initial 100m from blade length buffer requested, a buffer of either 175m or 168m for turbine towers would be required (depending on the rotor diameter as outlined in **Chapter 4)**. One wind turbine (turbine 7) is located 150m from the centre of the link, all others are in excess of 195m from the link centre line. Further discussions with BT are necessary to establish if 150m is an acceptable buffer, or whether further mitigation would be required, this would take place once micro siting is confirmed, post consent.

10.4.13 MBNL identified a single microwave link running across the Development Site and requested a buffer of 100m from the link centre line. All proposed turbine locations are in excess of 200m from the link centreline.

10.4.14 Highlands and Islands Enterprise identified a single microwave link running across the Development Site and requested a stand-off buffer based on *"the radius of the F2 Fresnel zone of the link (13GHz) at the 90 degrees intersection point with the turbine, plus the turbine blade radius, plus a 25m margin and any micro-siting margin"*. Based on the proposed turbine blade lengths, this would result in a buffer of either 104m or 111m, depending on turbine size. The closest turbine to this link is turbine 20, which is 140m from the centreline. Highlands and Islands Enterprise subsequently confirmed that this turbine location was acceptable, provided that micro-siting was limited to 20m in the direction of the link.

10.4.15 NATS provided details of a microwave link running across the Development Site as part of its response to the aviation consultation. This link runs within 20m of the proposed location of turbine 8 and it has not been possible to relocate the turbine. Further discussion with NATS will be undertaken and it is likely that mitigation would be proposed and secured through a planning condition.

10.5 Scope of Assessment

Potential Receptors

10.5.1 The methodology used in this chapter includes evaluating:

- Potential effects on utility infrastructure;
- Potential effects on broadcast signals;
- Potential effects on telecommunications.; and
- Potential effects on aviation and radar.

10.5.2 With regards to potential infrastructure receptors, SHEPD and Scottish Water assets may be affected by the Proposed Development.

10.5.3 With regards to microwave links and fixed telecommunication, links operated by JRC, Airwaves, MBNL, BT, NATS and Highlands and Islands Enterprise have the potential to be affected by the Proposed Development.

10.5.4 Wind farms can also affect domestic television signals. The Proposed Development is located between Stornoway and the Eitshal transmitter, and therefore television reception could be adversely affected by the Proposed Development.

10.5.5 With regards to potential aviation interests, the safety of Air Traffic Service Provision has the potential to be affected by the Proposed Development and, due to the height of the proposed turbines, aviation lighting would be required.

10.6 Likely Significant Effects

Predicted Effects: Construction

Predicted Effects: Utilities and Infrastructure

10.6.1 With regards to potential infrastructure receptors, the access tracks that would be constructed have the potential to affect a SHEPD 33kV pole mounted power line, and the underground cable linking Beinn Greidaig Wind Farm to the SHEPD substation, should appropriate mitigation not be put in place.

10.6.2 Scottish Water pipework near the Development Site entrances on the A859 could also be affected should appropriate mitigation not be put in place.

Predicted Effects: Telecommunications

10.6.3 There would be **no effects** on microwave links during construction of the Proposed Development.

Predicted Effects: Television Reception

10.6.4 There would be **no effects** on television reception during construction of the Proposed Development.

Predicted Effects: Aviation

10.6.5 Article 222 of the UK Air Navigation Order (ANO) 2016 requires aviation warning lighting are fitted to cranes, which could be relevant to the construction period. It states: "*Away from the immediate vicinity of an aerodrome and where the maximum crane height is less than 150 meters aviation warning lighting is not a legal requirement. However, given the likelihood that such cranes will be amongst the tallest structures in any given location the CAA recommends that, in order to ensure that the crane operator fulfils his duty of care towards others, the crane user (contractor) considers using aviation warning lighting in line with the following: - Cranes that are between 90 meters and 150 meters (approximately 300 – 500 feet) high being equipped with medium intensity steady red lighting positioned at the highest point and both ends of the jib, such that the lighting will provide an indication of the height of the crane and the radius of the crane jib. Such lighting, which should be displayed at night, should be positioned so that when displayed it is visible from all directions. - Cranes that are 60 meters to 90 meters (approximately 200 – 300 feet) high being equipped with low intensity steady (generically 32 candela) red lighting positioned as close as possible to the highest point and, for tower cranes, to the top of the fixed structure. Such lighting, which should be displayed at night, should be positioned so that when displayed it is visible from all directions.*"

10.6.6 CAP 738 Safeguarding of Aerodromes provides the following information for aviation stakeholders with regard to the use of cranes within their safeguarded areas. Should a crane be required on or in the vicinity of an aerodrome, the attention of the crane operator should be brought to the British Standard Institute Code of Practice for the safe use of Cranes, BS 7121, Part 1. In particular, paragraph 9.3.3 says that the appointed person should consult the aerodrome/airfield manager for permission to work if a crane is to be used within 6 km of the aerodrome/airfield and its height exceeds 10 m or that of the surrounding structures or trees.

10.6.7 Cranes associated with the construction of the Proposed Development may therefore carry aviation warning lights dependent upon their height and it has been assumed that up to two cranes would be present on site during the construction period. As discussed in **Chapter 6: Landscape and Visual**, the visual effects of these lights would be **Substantial / Moderate** and **significant**, but limited to a more localised geographical area, extending out to approximately 2km from the light sources locations due to their lower light intensity and fewer number., The nature of these effects would be temporary, direct, cumulative and negative. During construction of the Proposed Development embedded mitigation practices will adequately provide information to aviation stakeholders (in this regard MOD and HIAL). The sensitivity of the stakeholder is medium and the magnitude of effect is low. The effect on aviation stakeholders during the construction phase is expected to be not significant, subject to the completion of standard notification to aviation authorities as detailed in **Section 10.6.5.**

Predicted Effects: Operation

Predicted Effects: Infrastructure

10.6.8 There would be **no effects** on infrastructure assets as a result of the operation of the Proposed Development.

Predicted Effects: Telecommunications

10.6.9 The Proposed Development could affect the operation of microwave and scanning telemetry links that run across the Development Site. The consultation exercise identified six operators that could be affected (JRC, Airwaves, MBNL, BT, NATS and Highlands and Islands Enterprise). Further consultation has subsequently been undertaken with all of these operators, and buffers established that seek to limit any effects on the microwave and scanning telemetry links.

10.6.10 MBNL, Airwaves and Highlands and Islands have confirmed that there would be no impact on their network as a result of the Proposed Development.

10.6.11 One turbine is within the 175m buffer requested by BT, but outside a smaller buffer of 130m based on an assessment using the 2nd fresnel zone of 30m, plus blade length and a 25m buffer, as initially proposed by BT. On this basis, there should be no interference with this link, although the turbine should not be micro-sited towards the link centreline.

10.6.12 Turbine 8 is located within 20m of the centre line of the NATS microwave link. Discussions are ongoing with NATS to establish the most appropriate mitigation solution.

10.6.13 One of the JRC scanning telemetry links relates to the Pentland Road Wind Farm communication array. This link originates close to a number of proposed turbine locations and runs through the proposed location of turbine 21. As per the consented layout, it has not been possible to mitigate the effects on this link and so JRC have assumed that the link will require mitigation through relocating the link.

10.6.14 All turbines are in excess of 130m from the other JRC scanning telemetry links, and at least 160m from the JRC fixed link. Whilst it is believed that this is acceptable, the Applicant has requested confirmation of this from JRC but no response has been received to date.

Predicted Effects: Television Reception

10.6.15 Wind turbines have the potential to adversely affect terrestrial television reception up to a maximum distance of 5km (Ofcom, 2009) and there are a number of properties within this distance of turbines. However all transmitters in the UK are now fully switched over from analogue to digital signals, which reduces the likelihood of interference with the television signal.

10.6.16 When several turbines are sited in close proximity, the interactions of these interference mechanisms are complex and difficult to predict. There are, however, several ways that any potential problems can be mitigated.

10.6.17 Ofcom (2009) recommend that turbines should be sited at least 500m away from a viewer to help reduce the likelihood and severity of any interference. Design iteration has ensured that a maximum distance between turbines and residential dwellings was applied wherever possible and this has resulted in a minimum separation distance to properties of approximately 1,800m.

10.6.18 The nearest digital television transmitter is located at Eitshal, 3.9km to the south west of the Development Site, and 4.1km from the nearest turbine. The Development Site lies between the transmitter and Stornoway, and interference from the transmitter is therefore possible for receptors in Stornoway.

Predicted Effects: Aviation

10.6.19 A principal safeguarding concern of the MOD with respect to the development of wind turbines relates to their potential to create a physical obstruction to air traffic movements (low flying) and Air Defence Radar (ADR) installations. A Line of Sight (LOS) assessment has been undertaken[1] for the Proposed Development which has concluded that there is no detectability of the Proposed Development by the ADR in the region due to the distance between the receptors, curvature of the earth and intervening terrain. There would therefore be no effect on ADR installations as a result of the operation of the Proposed Development; the MOD has no objection to the Proposed Development and therefore ADR effects are scoped out. However the MOD has identified that aviation lighting would be required. This is discussed below.

10.6.20 HIAL has indicated that the Proposed Development falls inside of the safeguarded areas for Stornoway Airport and that the proposed wind turbines would present a significant infringement to the safeguarded area and associated communications systems. The CAA expects HIAL to provide evidence that the safety of Air Traffic Provision would not be compromised or degraded by the Proposed Development and a safety case / full assessment would need to be submitted to them. A Safeguarding Assessment was undertaken for the Consented Development. However, due to the change in layout and increase in wind turbine blade tip height, an updated safety case would be required. Discussions continue between the Applicant and HIAL regarding the potential impacts of the Proposed Development on aviation. New flight procedures were agreed with HIAL in order to accommodate the Consented Development. If necessary, the Applicant would work with HIAL to agree suitable mitigation if the larger turbines as currently proposed lead to additional effects beyond those previously identified.

10.6.21 Based on preliminary technical findings, the Proposed Development was found to conflict with NATS safeguarding criteria. Further examination by their technical and operational safeguarding teams deemed the potential impact on air-ground communications to be acceptable. However, NATS is maintaining their objection to the Proposed Development due to the risk to operation of two microwave links. Discussions are ongoing between the Applicant and NATS to establish the most appropriate mitigation solution.

10.6.22 Both HIAL and the MOD have requested that aviation lighting is fitted to the proposed turbines in the interests of aviation safety. In accordance with ANO (2016) requirements, aviation warning lighting would be required on all 35 turbines of the Proposed Development, assuming these would be in excess of 150m in height to blade tip. The CAA policy statement *'Lighting of Onshore Wind Turbine Generators in the United Kingdom with a maximum blade tip height at or in excess of 150m Above Ground* Level', advises that that medium intensity (2000 candela), red, aviation warning lights

[1] Osprey undertook radar performance and propagation modelling to determine the theoretical detection of the proposed wind turbines by the region's radar (surveillance) infrastructure. This was carried out using the ATDI ICS LT 4.3.3 tool to model the terrain elevation profile between the identified PSR and ADR and the Development Site, to provide a graphical representation of the intervening terrain and theoretical direct Line of Sight (LOS), in order to determine the affected radar systems.

are fitted as close as possible to the top of all fixed structures which have a total height of more than 150m above ground level.

10.6.23 The specific aviation warning light requirements for the Proposed Development are therefore as follows:

- Aviation warning lights fitted to each of the 35 turbines would comprise four lights as follows:
  - One medium intensity lighting unit (2000 candela) at hub height (105m and 88m AGL); and
  - Three low intensity lighting units (32 candela) at half hub height (52.5m and 44m AGL).
- It is assumed the lighting would be operated by an automatic control device which reliably allows the lighting to be activated when the ambient threshold falls below 500 LUX in accordance with the requirements of the CAA policy statement and Article 222 of the ANO (2016).

10.6.24 The above lighting specification has been used to model the effects of the aviation warning lights for a Night-time Assessment, which is included as **Appendix 6D**. The Night-time Assessment concludes that significant visual effects would arise within 10km of the Proposed Development as a result of the required aviation warning lights.

Predicted Effects: Met Office Radar

10.6.25 The Met Office have not responded to the consultation. For the purposes of this Chapter it is assumed that the mitigation agreed under the Consented Development scheme, i.e. the re-location of the Met Office Radar, is sufficient to ensure the revised scheme would have no unacceptable effects on Met office operation on the Island.

Predicted Effects: Decommissioning

10.6.26 There would be no effects on infrastructure, telecommunication links, broadcast services during decommissioning, and these are not considered further in the assessment.

10.6.27 In line with Article 222 of the ANO) (2016), cranes associated with the decommissioning of the Proposed Development may be required to carry aviation warning lights dependent upon their height and it has been assumed that up to two cranes would be present on site during the decommissioning period. The visual effects of these lights during decommissioning would be the same but to a lesser degree as those encountered during construction, as discussed in **Chapter 6: Landscape and Visual** and summarised in in **Section 10.7.6** and would be **significant**.

Predicted Effects: Cumulative

10.6.28 All potential effects in respect of telecommunications, infrastructure and utilities can be or have been mitigated therefore no cumulative effects would arise.

10.6.29 It has been identified in **Chapter 6** and **Appendix 6D** that temporary, direct, cumulative and negative effects, which would be **significant** (in terms of landscape and visual amenity**)** would arise during the construction and decommissioning periods as the cranes associated with these phases would be required to carry aviation warning lights. The aviation warning light requirements for the Proposed Development are assessed in **Chapter 6** and **Appendix 6D**. The assessment concludes that long-term (reversible), direct, cumulative and negative effects, which would be **Substantial / Moderate** and **significant** would arise whilst the Proposed Development is operational.

10.6.30 Unmitigated, the impact that the Proposed Development would create to aviation operations is limited to specific procedures at Stornoway Airport and its immediate environs which would not be impacted by other windfarm developments and therefore cumulative effects are **not significant**.

10.7 Mitigation Measures

Infrastructure

10.7.1 SHEPD and Scottish Water would continue to be consulted if required to ensure that their infrastructure is not adversely affected during the construction of the Proposed Development.

10.7.2 All relevant H&S guidance would be adhered to during design and construction of the wind farm. This would be relevant to the proposed access track beneath the 132kV and 33kV SHEPD power lines. It is likely that these power lines would require undergrounding at certain points in order to avoid any abnormal load vehicles hitting the lines or effects of electricity jump as loads move in close proximity to the OHL. However, by following HSE guidance note GS6 and liaising with SHEPD in order for this remediation work to be undertaken, no adverse impact is anticipated on their infrastructure.

10.7.3 A micro-siting provision has been requested such that any turbine can be moved up to 50m taking into account known environmental and telecommunications constraints. It is intended that this provision would be used to respond to any additional unforeseen infrastructure constraints.

Telecommunications

10.7.4 Following the identification of appropriate buffer distances for nearly all the microwave links, it is anticipated that there would be either no impact or negligible impact on links operated by JRC, Airwaves, BT, MBNL and Highlands and Islands Enterprise. There should be no requirement for mitigation on these links, although Highlands and Islands Enterprise requested that T20 be restricted to a Micrositing limit of 20m towards the link.

10.7.5 JRC are expected to request that micrositing of certain turbines (T1, 2, 3, 4, 7, 8, 9, 10, 11, 28 and 34) towards the relevant link to be restricted to avoid interference. A detailed response to the Proposed Development has yet to be received. Should limitations to micrositing be required by JRC, this could be controlled by planning condition.

10.7.6 One of the scanning telemetry links relates to the Pentland Road Wind Farm communication array. This link originates close to a number of proposed turbine locations and runs through the location of turbine 21. As per the consented layout, JRC has assumed that the link would require mitigation through its relocation. For the 2015 consented wind farm JRC stated the following:

"Dependant on location and timescales of the proposed cluster substation that will service both this and Pentland Rd windfarm; a non-radio mitigation solution may be required for the existing/new communications link to the windfarm(s). This cost should be covered by the developer."

10.7.7 The same condition would be required for The Proposed Development.

10.7.8 The NATS microwave link would require mitigation to avoid the Proposed Development affecting it. Discussions with NATS are ongoing, but given the current distance between the link and turbine 8, it appears that the most likely solution is a re-routing of the link at the Applicants expense.

Television Reception

10.7.9 In the event of a reduction in television reception quality occurring in the surrounding area, it is most likely to be noticed when the Proposed Development becomes operational. To mitigate any problems with reception arising, the Applicant would accept a 'Requirement' to assess current television signals in advance of the construction of the Proposed Development and would mitigate post-development problems with television reception arising where effects are attributable to it.

10.7.10 The 'Requirement' would require the Applicant to meet the cost of investigating and effectively rectifying any problems should they arise and to implement solutions in a timely manner so as to minimise any inconvenience to residents. While a reduction in television reception quality is unlikely, it is expected that if any issues arise, these would occur within the first year of operation of the Proposed Development and any remedial work would therefore be limited to this period only.

10.7.11 Viewing quality can be improved by considering each or a combination of the following mitigation measures:

Replace or upgrade the receiving aerials (e.g. with directional receiving aerials) for any affected households;

Re-tune the television receivers at any affected households;

Re-align the television aerial and re-tune the receiver at any affected households; and

Provision of a bespoke 'self-help' solution (this could comprise a new low powered transmitter, a cable network, a satellite receiver or a combination of these measures).

10.7.12 By implementing these measures, it is anticipated that any television reception issues as a result of the Proposed Development would be fully mitigated.

Aviation

10.7.13 Discussions continue between the Applicant and HIAL regarding the impact of the Proposed Development on the Airport and associated communications systems. New flight procedures were agreed with HIAL in order to accommodate the Consented Development. If necessary, the Applicant would work with HIAL to agree suitable mitigation if the larger turbines as current proposed lead to additional effects beyond those identified for the Consented Development. Where mitigation is required it will take the form of modified flight procedure.

10.7.14 No mitigating alternative is currently available for aviation warning lights complaint with Article 222 of the ANO (2016), for turbines of more than 150m in height to blade tip. The Night-time Assessment set out in **Appendix 6D** has been based on a precautionary 'worst case' and the possibility for no lighting, or reduce intensity lighting (under Article 222, and CAA policy statement, clause 'g') has not been consulted on with the CAA at this stage. The use of Radar Proximity Activated Lighting is however preferred and SNH has advised that this could result in the lights being activated for less than 2% of the time. Although used in Europe and elsewhere, it is not currently permitted in the UK. SNH also suggests that the turbine lighting could potentially be shielded to reduce the prominence of the lighting. This option however is not currently permitted in the UK in respect of aviation warning lights.

10.7.15 In terms of the Met Office radar on the Isle of Lewis, the mitigation was previously agreed under the Consented Development scheme, i.e. the re-location of the Met Office Radar. It is considered that this previously agreed mitigation is sufficient to ensure the revised scheme would have no unacceptable effects on Met Office operation on the Island.

10.8 Summary of Mitigation Measures

10.8.1 **Table 10.5** summarises the mitigation that has been identified to mitigate the potential effects of the Proposed Development on infrastructure, telecommunications and aviation as detailed in the preceding sections.

Table 10.5 Summary of Mitigation Measures

Receptor and Effect	Responsibility for Implementation	Compliance Mechanism
Infrastructure – interference with 132kV and 33kV Scottish Power electricity transmission line	Developer / Contractor	Power lines would be undergrounded and protected where required, following liaison with SHEPD.
Infrastructure – Beinn Greidaig 33kV underground cable	Developer / Contractor	Power lines would be located and additional protection put in place if required during track construction.
Telecommunications – NATS microwave link	Developer	NATS microwave link would likely be re-routed using a new transmitter, if required.
Telecommunications – Highlands and Islands	Developer / Contractor	Restrict micrositing of Turbine 20 to 20m in the direction of the microwave link.
Telecommunications – JRC – Pentland Road Wind Farm Scanning Telemetry Link	Developer	A non-radio mitigation solution may be required for the existing/new communications link to the wind farm(s).
Telecommunications – JRC	Developer / Contractor	Restrict micrositing of a number of turbines in order to prevent the turbine moving closer to the identified link(s). JRC still to respond to application layout.
Television reception	Developer	A mixed solution would be required in the unlikely event that the Proposed Development turbines interfere with TV reception. This may include: - Re-tuning some TVs which may overcome possible interference for some; and - A transposer system could overcome possible reception difficulties.
Aviation	Developer	Discussions are ongoing between the Applicant and HIAL regarding the impact of the Proposed Development on the Airport and associated communications systems.
Aviation Lighting	Developer	No mitigating alternative is currently available for aviation warning lights complaint with Article 222 of the UK ANO (2016), for turbines of more than 150m in height to blade tip.
Met Office Radar	Developer	The previously agreed mitigation solution for the Consented Development will be implemented, which requires the relocation of the existing Met Office radar site.

10.9 Evaluation of Impacts

10.9.1 This Chapter has demonstrated that impacts on infrastructure and telecommunications can be fully mitigated where required. As such, there would be no significant residual effects on the identified infrastructure and telecommunications interests.

10.9.2 **Significant** (long-term, reversible) effects have been identified as a result of the aviation lighting requirements in terms of landscape and visual effects, for which there is currently no mitigating alternative. Discussions are ongoing between the Applicant and HIAL regarding the impact of the Proposed Development on the Airport and associated communications systems, however the existing mitigation set out for the Consented Development demonstrated that mitigation is available to make the Proposed Development acceptable in terms of aviation safety.

10.9.3 Discussions are also ongoing between the Applicant and NATS to establish an appropriate mitigation solution due to the risk to operation of two microwave links as a result of the Proposed Development.

10.10 References

BBC, Radio communications Agency and Independent Television Commission, 1999. The Impact of Large Buildings and Structure(s) on Terrestrial Television Reception.

Civil Aviation Authority (March 2016) The Air Navigation Order 2016. http://www.legislation.gov.uk/uksi/2016/765/contents/made

Civil Aviation Authority (June 2017) DAP Policy: Lighting of Onshore Wind Turbine Generators in the United Kingdom with a maximum blade tip height at or in excess of 150m Above Ground Level. http://publicapps.caa.co.uk/modalapplication.aspx?catid=1&pagetype=65&appid=11&mode=detail&id=7967&filter=2

Energy Networks Association Engineering recommendation Issue 1 2012 Separation between Wind Turbines and Overhead Lines Principles of Good Practice. http://www.spenergynetworks.co.uk/userfiles/file/Energy_Networks_Association_Separation_Wind_Turbines_Overhead.pdf

LinesearchBeforeUDig website http://www.linesearchbeforeudig.co.uk

Ofcom, Tall structures and their impact on broadcast and other wireless services, August 2009.

Outer Hebrides Onshore Wind Energy Supplementary Planning Policy Guidance (November 2018).

Planning Circular 2/2003 Safeguarding of Aerodromes, Technical Sites and Military Explosive Storage Areas, updated 2016. https://www.gov.scot/publications/planning-circular-2-2003-scottish-planning-series-town-country-planning-0755923111/

Scottish Government Onshore Wind Turbines Information (First published February 14, 2011 updated February 14 & 25, 2011, August 5, 2011, January 27, 2012, March 14, 2012 , May 02, 2012, August 28, 2012, October 24, 2012, July 17, 2013, December 2013 and last updated May 28, 2014). http://www.scotland.gov.uk/Resource/0044/00440315.pdf

11. Geology, Hydrology and Hydrogeology

Non-Technical Summary

The main potential water effects associated with the Proposed Development relate to the construction phase, which would involve excavation and dewatering of borrow pits; formation and upgrading of access tracks; excavation, dewatering and placement of turbine foundations; and formation and upgrading of watercourse crossings. Such activities could result in, for instance, the interception of surface water and groundwater and the generation of additional, silt-laden runoff, and fuel, oil, and chemical spillages, with resulting detrimental water quality (including flooding) and quality effects on the above-named receptors.

Potential effects on the water environment as a result of the Proposed Development would be more limited in the operational phase. Nevertheless, operational traffic and maintenance activities could still result in the generation of additional, silt-laden runoff and fuel, oil and chemical spillages, with resulting detrimental water quantity (including flooding) and quality effects on the receptors noted. Similar potential effects are predicted during the decommissioning phase, albeit to a slightly lesser degree.

It has been determined that only potential significant effects are predicted with respect to two low value groundwater-dependent habitats on Cnoc Loch a' Leadharain. The effects are principally due to the proposed excavation of a borrow pit across the two habitats and their catchments. No cumulative effects on the water environment have been identified. Additional mitigation over that embedded in the design of the Proposed Development has been considered. Borrow pit micro-siting is contemplated but is not advocated, because when considering the effects on the wider-scale wet heath and blanket bog habitat rather than the water conditions supporting the local habitats, the overriding ecology assessment advocates the adoption of a Habitat Management Plan. In addition, a water quality 'monitoring and respond' programme is recommended.

On this basis, with both embedded and additional mitigation in place, standalone and cumulative effects of the Proposed Development on all water receptors are not significant, with the exception of conditions supporting two groundwater-dependent habitats, which are in any case not considered a concern in the overriding ecology assessment.

11.1 Introduction

11.1.1 This chapter of the EIA Report assesses the potential effects of the Proposed Development with respect to geology, hydrology (including flood risk) and hydrogeology. The chapter should be read in conjunction with the development description provided in **Chapter 4: Description of the Proposed Development** and with respect to relevant parts of **Chapter 9: Ecology**, where common receptors have been considered and where there is an overlap or relationship between the assessment of effects.

11.2 Limitations of this Assessment

11.2.1 Whilst there are some information gaps, as listed below, there are considered to be no limitations relating to geology, hydrology and hydrogeology that affect the robustness of the assessment of the potential effects of the Proposed Development:

- All requested data have been received, and whilst some parts of the Development Site have not been visited or considered in detail, all infrastructure locations and all sub-catchments that would contain infrastructure were subject to a site walkover in 2019;

- Flow monitoring and water quality data do not cover the entire Development Site. The flow data in particular are focussed on the Abhainn Ghrioda (River Creed). However, the record for the Abhainn Ghrioda is long standing and is likely to be representative of the other watercourses originating or flowing through the Development Site;
- No monitoring data are available regarding groundwater levels across the Development Site, but the extensive coverage of peat is taken to indicate the presence of shallow groundwater; and
- Whilst all abstractions in the area have been identified through discussion with the Scottish Environment Protection Agency (SEPA) and CnES, not all details of those abstractions are known e.g. historic abstraction quantities or water quality. However, information has been obtained to approximate their catchment areas, for consideration in respect to the Development Site. Due to the limited overlap of the catchments with the Development Site, no further information is considered necessary.

11.3 Relevant Legislation, Planning Policy, Technical Guidance

Legislative Context

11.3.1 The legislative context forming the backdrop to this EIA Report is set out in **Chapter 5**. The key legislative drivers relating to the water environment which that have been considered in this assessment are set out in **Appendix 11A: Relevant legislation and technical guidance list.** Of these, the main legislation of relevance to the Proposed Development include the following:

- The WFD is a wide-ranging directive that establishes a legal framework for the protection, improvement and sustainable use of surface waters, transitional waters, coastal waters and groundwater resources. The WFD is translated into Scottish legislation by the Water Environment and Water Services (Scotland) Act 2003 (WEWS);
- Regulation of activities relating to the water environment, as per the requirements of WFD and WEWS, is implemented through CAR. This covers activities including abstraction, discharges, impoundments and engineering works that could impact on a watercourse. Depending on the size and nature of the activity, General Binding Rules (GBRs) need to be followed, the activity registered, or a full licence obtained; and
- There are also daughter directives of the WFD that are relevant to the Proposed Development. Most notably, this includes the Groundwater Daughter Directive, which aims to protect groundwater from pollution by assessing and monitoring the chemical status of groundwater and preventing and limiting indirect discharges of pollutants to groundwater. The Directive also pertains to the quality of fresh waters needing protection or improvement to support fish life. This condition was previously under the Freshwater Fish Directive that was repealed in 2013.

Planning Policy Context

11.3.2 NPF3 was published in June 2014 and sets the long-term context for development planning in Scotland. However, NPF3 does not contain any specific policies with regard to how onshore wind energy developments impact upon geology, hydrology and hydrogeology.

11.3.3 The Scottish Government (SGt) Scottish Planning Policy (SPP, June 2014) sets out national planning policies that reflect the priorities of the Scottish Ministers for the operation of the planning system and the development and use of land through sustainable economic growth. SPP 161 -166 relate to wind farms in general, whilst SPP 254 - 268 specifically cover flooding and drainage and so are summarised in **Table 11.1** (in chronological order, oldest first).

11.3.4 National planning policy is supported by Planning Circulars, Planning Advice Notes (PANs) and Specific Advice Sheets (SASs) and Ministerial / Chief Planning Letters to Planning Authorities, which set out detailed advice from the SGt in relation to planning issues. The PANS and SASs considered most relevant to the Proposed Development are summarised in **Table 11.1**.

11.3.5 The statutory Development Plan applicable to the Development Site comprises the Outer Hebrides Local Development Plan (LDP) (adopted 2018) together with statutory Supplementary Planning Guidance (SPG), including that for Wind Energy Development (adopted 2018). The Development Plan policies particularly relevant to water are listed in **Table 11.1**. The Wind Energy Development SPG requires such development proposals demonstrate that they have been designed to minimise any detrimental impact on the water environment.

Table 11.1 Planning Policy Issues Relevant to Geology, Hydrology and Hydrogeology

Policy reference	Policy Overview
National planning policies	
SGt SPP 2014, Policies 254 - 268	The SPP provides guidance to planners and developers on how to approach the issues of flood risk and drainage. It establishes that a precautionary approach to flood risk from all sources should be taken, alongside ensuring development proposals would increase the flood resilience of their surroundings. Development proposals that would have a significant probability of being affected by flooding or increase the probability of flooding occurring elsewhere are not permitted by the SPP.
SGt Controlling the Environmental Effects of Surface Mineral Workings (PAN 50), October 1996	This PAN gives good practice advice for planners and developers on the more significant environmental effects arising from mineral working operations, including borrow pits.
SGt Planning and Sustainable Urban Drainage Systems (PAN 61), July 2001	This PAN gives good practice advice for planners and developers on the use of sustainable drainage systems (SuDS) and complements the Sustainable Urban Drainage Systems Design Manual for Scotland and Northern Ireland.
SGt Water and Drainage (PAN 79), September 2006	This PAN clarifies the role of the planning authority in setting the direction of development to inform the planning and delivery of new water infrastructure in a coordinated way. It explains the role of Scottish Water and SEPA and encourages joint working to ensure a common understanding of capacity constraints and agreement on the means of their removal. It advises on the appropriateness of private schemes and the handling of Scottish Water developments.
SGt Wind Farm Developments on Peat Land, May 2013	The SGt has supported the development of the carbon calculator for use in the consideration of carbon savings from wind farm developments on peatlands. Originally published in 2008, a revised version launched in June 2011 refined the calculator following feedback and further research.
SAS (updated 28 May 2014): Onshore Wind Turbines	This provides advice for planning authorities on planning issues to be considered in relation to onshore wind farms, including water.
SAS: Peatland Survey 2017: Guidance on Developments on Peat Land	This guidance defines a consistent sampling methodology to quantify and qualify the peat material on site and provides advice as to how to publish peat surveys as part of a developer's wider site investigations.
Development plan policies	
Development Plan Policy EI 1: Flooding	This policy requires development proposals to be flood resilient, avoid areas susceptible to flooding and promote sustainable flood management. Where development proposals could lead to an increase in the number of persons or buildings affected by flooding, then a flood risk assessment will be required to demonstrate compliance with the SPP.
Development Plan Policy EI 2: Water and Waste Water	This policy requires development proposals to incorporate SuDS to ensure water and waste water are managed in a sustainable manner.
Development Plan Policy EI 3: Water Environment	This policy requires development proposals to avoid having an adverse impact on the water environment.

Technical Guidance

11.3.6 The EIA presented here has been undertaken primarily using a semi-quantitative assessment based on professional judgement and statutory and general guidance. Relevant policy and general guidance utilised is set out in **Appendix 11A: Relevant legislation and technical guidance list.** The lead organisation for each of the key technical guidance is set out below:

- British Standards;
- Construction Industry Research and Information Association (CIRIA);
- Department for Food, Environment and Rural Affairs (Defra);
- Forestry Commission (FC) and Forestry Commission Scotland (FCS);
- Ministry of Agriculture, Forestry and Food (MAFF);
- Scotland and Northern Ireland Forum for Environmental Research (SNIFFER);
- SEPA;
- Scottish Executive (SE);
- SGt;
- Scottish Natural Heritage (SNH); and
- Scottish Renewables (SR).

11.4 Data Gathering Methodology

Study Area

11.4.1 Both desk study and survey data for this environmental topic chapter have been gathered with respect to a defined Study Area. The Study Area is focussed on the Development Site and a 0.5km buffer area immediately beyond its boundary. This buffer area extent is the same as that assumed for the previous wind farm EIAs at this site (Entec, 2011; Amec Foster Wheeler, 2015), and is considered appropriate for the identification and assessment of effects associated with the Proposed Development. However, data for a wider area beyond this have also been collected as appropriate, such as abstractions, discharges and conservation sites.

Desk Study

11.4.2 The appraisal involves the collection and interpretation of a wide range of data and information from published material, plus consultations relating to the local and wider hydrological environment with statutory bodies, principally SEPA and CnES. The data collected, and other sources of information, are listed in **Table 11.2**.

11.4.3 The hydrology assessment is also inter-related with, and uses information from, other chapters of this EIA Report, in particular **Chapter 9.**

Table 11.2 Sources of Desk Study Information for Geology, Hydrology and Hydrogeology

Source	Data
Ordnance Survey (OS) 1:50,000, Landranger Sheet 8 Stornoway & North Lewis **OS 1:25,000, Explorer Sheet 459 Central Lewis & Stornoway** **OS Land-Form Profile 10m Digital Terrain Model (DTM)** **OS MasterMap** **OS 1;10,000 Raster map**	Topography and features
Centre for Ecology and Hydrology (CEH) National River Flow Archive (www.ceh.ac.uk/data/nrfa/index.html) **https://www.metoffice.gov.uk/** **Flood Estimation Handbook (FEH) CD-ROM** **SEPA flow gauging data for the Abhainn Ghrioda at Creed Bridge – catchment annual average rainfall estimate** **CEH-GEAR data (https://nrfa.ceh.ac.uk/catchment-rainfall)**	Climate
British Geological Survey (BGS). Lewis and Harris North- Structure Geological Sheet (1:100,000), and accompanying Outer Hebrides Memoir **BGS. Hydrogeological Map of Scotland (1:625,000) (1988)** **BGS DiGMap BG 2009 (1:10,000)** **BGS GeoSure and EnviroSure reports** **BGS/Natural Environment Research Council (NERC). A GIS of Aquifer Productivity in Scotland. Explanatory Notes. Commissioned Report CR/04/047N: http://nora.nerc.ac.uk/504764/1/CR-04-047N_SEPA%20Aq%20productivity.pdf** **Aquifer classification map layer on Scotland's Environment website https://map.environment.gov.scot/sewebmap/** **SEPA/BGS/SNIFFER. Vulnerability of Groundwater in the Uppermost Aquifer (Scotland)** **BGS Groundwater Vulnerability (Scotland) http://www.bgs.ac.uk/discoverymetadata/13603084.html**	Geology, ground conditions and hydrogeology
Soil Survey of Scotland, Stornoway and North Lewis (1:50,000) **National soil map of Scotland http://soils.environment.gov.scot/** **QJEG vol.19, 1986 Hobbs. Mire morphology and properties and behaviour of some British and foreign peats** **Peat survey of the Development Site (Entec, 2010)**	Soils and peat
River Network Map **CEH National River Flow Archive (NRFA) (www.ceh.ac.uk/data/nrfa/index.html)** **SEPA observed flow gauging data for the Abhainn Ghrioda at Creed Bridge station**	Hydrology and flows

Source	Data
SEPA flood map (http://map.sepa.org.uk/floodmap/map.htm) **Landmark 1 in 75, 1 in 100 and 1 in 1000 year flood maps** **FEH CD-ROM** **Flood Studies Supplementary Report No. 16**	Flood risk
SGt. The River Basin Management Plan for Scotland River Basin District 2015-2027 **SGt interactive mapping (https://map.environment.gov.scot/sewebmap/?layers=riverClass)** **SEPA interactive mapping facility for the Scotland River Basin Management Plan (RBMP) (https://www.sepa.org.uk/data-visualisation/water-environment-hub/?riverbasindistrict=Scotland)** **SEPA data request: information on river water quality** **Allt na Craoibhe (B897) Monthly water quality samples collected from the site, 2003 to 2013**	RBMP and water quality
SEPA data request: information on locations of CAR licences **CnES. private water supplies (PWSs) from http://dwqr.scot/private-supply/pws-location-map/** and data request directly to CnES **SGt. Drinking Water Protected Areas. https://www.gov.scot/publications/drinking-water-protected-areas-scotland-river-basin-district-maps/** **Maps of the Drinking Water Protected Areas (DWPAs, Scotland): http://www.scotland.gov.uk/Topics/Environment/Water/17670/ProtectedAreasMaps2013**	Abstractions and discharges
https://sitelink.nature.scot/ **Ecology surveys - as per Chapter 9: Ecology**	Wetlands and peatlands

Survey Work

11.4.4 To inform this chapter, an extended site walkover was undertaken from the 14th to the 17th January 2019. This allowed a survey of water features to be undertaken, including inspections of the main watercourses and all proposed watercourse crossing locations and wetland sites of interest. Field water quality measurements were also taken within the watercourse catchments at key locations. The weather was above freezing with showers for the first two days, followed by colder weather for the remainder of the visit (a snowfall of approximately 10 mm occurred on the morning of the 16th January 2019). The final day of the visit (17th January 2019) was cold but clear, and the melting of snow resulted in the larger watercourses being in spate.

11.4.5 A previous hydrology-related walkover was undertaken from 21st March to 25th March 2011 inclusive. The survey was similar in scope to that undertaken in January 2019, but also initiated the Applicant's water quality monitoring at four watercourse locations over a period of three months. This historical monitoring data has also been used to inform the baseline water environment description presented below.

11.5 Overall Baseline

Current Baseline

11.5.1 This section, with the support of an overarching **Figure 11.1**, characterises the current local hydrological, geological and hydrogeological environment so that the most likely potentially significant effects of the Proposed Development, particularly relating to the construction and early operational phases, can be determined and appropriate additional mitigation identified.

11.5.2 The following description is based on the desk study utilising the data sources listed in **Table 11.2** and the results of the two site walkover surveys and associated monitoring data noted in **Section 11.4**.

Topography

11.5.3 The Development Site is located at elevations of between approximately 50m and 150m Above Ordnance Datum (AOD). The lowest elevations occur on the floodplain of the Abhainn Ghrioda on the eastern site boundary (National Grid Reference (NGR) NB 406 332). The highest elevation occurs on Beinn Hulabaidh (named Beinn Thulabaigh on historical OS mapping) (NGR NB 367 349), in the north west corner of the Development Site. The topography of the Development Site and surrounding area is shown in **Figure 11.2**.

11.5.4 To the south of the unclassified Pentland Road carriageway, elevations are generally around 70-80m AOD. The topography is undulating but with generally gentle slopes. However, there are occasional steeper slopes around areas of outcrop. A series of shallow ridges extend west - east, in line with the watercourse network.

11.5.5 To the north of Pentland Road, there are steeper slopes associated with Beinn Hulabaidh and the valley containing the Abhainn Lacasdail (River Laxdale) and its tributary the Allt Hogaraid.

11.5.6 There are a number of locations across the Development Site of flat topography where catchment divides are very indistinct. This includes the area to the north west of Sithean Moor (NGR NB 381 331) and the area south of Loch Garbhaig (NGR NB 375 353).

11.5.7 Reference to the Digital Terrain Model (DTM) produced for the Study Area shows slopes up to 1 in 20m/m (approximately 3° (degrees)). Slopes of up to approximately 1 in 3m/m (18°) occur in isolated areas.

Land Use

11.5.8 The Development Site is owned by Stornoway Trust and is primarily used for grazing, forestry, angling and peat cutting. In addition, the former Bardon Hebrides quarry, which is now Bennadrove Landfill and a recycling point, is located in the northern third of the Development Site (NGR NB 393 342), close to Loch Airigh na Lic.

11.5.9 Forestry plantations are found on the slopes of Beinn Hulabaidh, and intermittently across the Development Site to the south of Pentland Road. However, much of the forestry appears of poor quality with stunted growth.

11.5.10 Areas of existing and former peat cutting are located mainly on the floodplain of the Abhainn a' Ghlinn Mhòir (Glen River), and to the south of the A858 from approximately the Airigh an da Mhile (NGR NB 383 325) northwards and eastwards. In some places these appear to have had a noticeable influence on the local hydrology, creating localised preferential flow paths along the line of the cuttings.

11.5.11 Within the Development Site boundary, to the north of the Abhainn a' Ghlinn Mhòir, is the active Bennadrove Landfill, whilst Beinn Greidaig Wind Farm straddles the Abhainn a' Ghlinn Mhòir and Abhainn Ghrioda catchments.

11.5.12 Areas of quarrying are close to the Development Site but outside the boundary. These include the Bennadrove Quarry immediately outside the site boundary (NGR NB 346 343), Loch Airigh na Lic Quarry further to the east (NGR NB 400 343) and Marybank Quarry immediately opposite to the proposed northern site entrance (NGR 409 332). All these quarries are operated by Bardon Hebrides.

Climate

11.5.13 The average annual rainfall (1961 to 2015) for the Study Area is 1485mm, as determined from the CEH NRFA website[1], as well as the FEH CD-ROM catchment descriptors for the Study Area. Average monthly rainfall depths were calculated from daily rainfall data for the Creed Bridge gauge provided by SEPA for the period from February 1998 to November 2018 and are shown in **Table 11.3**. The average annual rainfall depth based on the SEPA data is 1383mm (for data between 1999 to 2017).

Table 11.3 Average Monthly Rainfall (Calculated from SEPA Data for 1998-2018)

Month	Rainfall depth (mm)
January	172
February	126
March	122
April	80
May	81
June	74
July	99
August	102
September	116
October	159
November	149
December	175

Solid Geology

11.5.14 Maps published by the BGS of the solid geology beneath the Study Area indicate that it comprises metamorphic bedrock of two complexes (defined as strata which contain more than one genetic

[1] The catchment averaged daily rainfall data have been derived from CEH-GEAR data, a 1 km gridded rainfall dataset generated from all daily and monthly observed rainfall data available for the UK from the Met Office. The rainfall grids were produced using the natural neighbour interpolation method, including a normalisation step based on average annual rainfall (1961-1990) (https://nrfa.ceh.ac.uk/catchment-rainfall). As a result, annual totals will vary from the SEPA gauged data.

class), namely the Outer Hebrides Thrust Zone Mylonites Complex and the Lewisian Complex of undifferentiated acid and basic gneiss, amphibolites and metamorphosed ultramafic bodies. The BGS DiGMap solid geology plan of the Study Area and buffer zone is presented as **Figure 11.3**.

11.5.15 The majority of the Study Area is underlain by proto-cataclasite (acid gneiss with cataclastic fabric) of the Outer Hebrides Thrust Zone Mylonites Complex. The proto-cataclasite bedrock in the northern and north eastern parts of the Study Area has been mapped to exhibit foliation, in a north west – south east direction with inclined dips in the range of 30° and 50°. Cataclastic foliation of the proto-cataclasite bedrock, dipping 20° south east, has also been mapped in the north western corner of the Study Area, close to Loch Bhatandiop (NGR NB 361 338).

11.5.16 Smaller parts of the Study Area are underlain by gneiss and calaclasite of the Lewisian Complex, the former present near the northern site entrance and Marybank Quarry, and the latter trending south west to north east in the south west corner of the Development Site (NGR NB 344 315), broadly parallel to its boundary, and associated with a thrust and slide plane dipping 20° to 30° to the east. An outcrop of an isolated body of ultramafic-rock is mapped near to Beinn Greidaig (NGR NB 364 335), with amphibolite associated with the Marybank Quarry gneiss.

11.5.17 During the walkover surveys the underlying solid geology was observed to outcrop in several locations, the main areas being south west of Loch a' Chlachain (NGR NB 356 322), north east of Loch Uisg' an t-Soluis (NGR NB 378 313), and north east and east of Loch a' Leadharain (NGR NB 391 334) as well as at the loch side itself. However, it is likely that other outcrop areas are also present across the Development Site. In general, outcrops occur on areas of higher ground.

11.5.18 A review of literature and web-based resources indicated that no statutory designations with respect to protected geological features currently apply to the Study Area, including Sites of Special Scientific Interest (SSSIs) or Regionally Important Geological Sites (RIGS).

Superficial Geology and Soils (Peat)

11.5.19 The BGS DiGMap information overlay of the Study Area does not show any superficial drift deposits. Other than isolated areas of outcropping bedrock on high ground, blanket bogs and variable thicknesses of peat deposits associated with the bogs overlie most of the Study Area. The Soil Survey Map shows that within the extensive blanket peat there are discrete areas of peaty gleys (saturated soils) and podzols (organic surface material). The only significant area of infill within the Development Site is the Bennadrove Landfill.

11.5.20 A study of the peat deposits within the Study Area has been undertaken during the site investigations in relation to this and earlier EIAs e.g. Entec (2010). This is discussed in more detail in **Appendix 9H: Peat Management Plan**. The peat depth surveys have been carried out in accordance with the Peatlands Survey Guidance[2]. The main findings are summarised below.

11.5.21 A review of the peat probing data indicates that a maximum peat depth of greater than 4 m was rarely recorded along watercourses. The majority of the Development Site was found to be covered by 0.25 to 3m of peat, the most common depth being just under 1m. Peat depths of greater than 3m were found to have an irregular distribution, but in general occurred on slope edges, topographic saddles or low lying hollows.

11.5.22 Peat core samples were recovered from the full depth of each probe hole to facilitate visual inspection and soil description.

[2] Peatland Survey (26 April 2017): Guidance on Developments on Peatlands (Scottish Government 2017).

11.5.23 A summary of the peat depths for each proposed turbine location is provided in **Table 11.4**. More information on peat depths at other locations can be found in **Appendix 9H: Peat Management Plan**.

Table 11.4 Peat Depths Recorded at Proposed Turbine Locations

Turbine	Peat depth (m)	Turbine	Peat depth (m)
1	1.1	**19**	2.5
2	2.1	**20**	0.5
3	1.2	**21**	1.2
4	1.9	**22**	1
5	3.1	**23**	1.5
6	0.9	**24**	0.8
7	1	**25**	1.5
8	0.3	**26**	3.3
9	0.5	**27**	2.3
10	0.6	**28**	1.3
11	2.6	**29**	0.9
12	1.3	**30**	1.9
13	4.2	**31**	0.8
14	1.1	**32**	1.6
15	3	**33**	0.5
16	0.4	**34**	1.4
17	1.8	**35**	1.2
18	2.1		

Mineral/Peat Extraction

11.5.24 Mineral extraction / surface mining operations have been identified adjacent to the perimeter of the Study Area. As mentioned earlier, there are three quarries in and around the Study Area, namely the Bennadrove, Loch Airigh ne Lic and Marybank Quarries. No other mineral extractions or quarries are depicted on the mapping resources available or were observed during the site visits.

11.5.25 There is a history of peat cutting at several locations across the Development Site and this activity continues to this day. Other than in areas of peat cutting, relatively little peat is exposed on the surface.

Ground Conditions

11.5.26 BGS GeoSure mapping data for the Study Area (acquired in 2010 but unlikely to have changed in the interim) indicates some geological characteristics that could result in potential risks to the Proposed Development in some parts of the Development Site. These would be likely to be related to combined influences of slope, geology, superficial deposits and water table depth. The BGS GeoSure mapping data illustrates the following:

- "*Compressible ground*" is mapped across much of the Study Area, with the exception of two isolated zones where no compressible strata are mapped. This is related to the peat covering the majority of the Development Site, as discussed earlier;
- Areas of potential slope instability are mapped based on the angle of the slope, with steeper slopes potentially being more prone to instability. This is shown in **Figure 11.4**;
- Slight potential for "*running sand*" conditions, which could occur due to rising water table levels, are shown across the majority of the Study Area (hazard rating B on a scale from A to E, where E is the highest hazard). The exception is for two small zones in the north west and south east of the Study Area, which are mapped as not being at risk. However, this does not appear to take account of the predominance of peat across the Development Site; and
- Other types of risks shown not to be relevant to the Study Area include collapsible deposits, shrink - swell characteristics, and soluble rocks. These risks are therefore not considered to be relevant for the Proposed Development.

11.5.27 Assessment of the ground conditions has also been made during site visits to inform the PMP (**Appendix 9H**) and the associated peat depth surveys. During the peat depth surveys, hummocky ground surfaces and ridges were observed at several locations. These features were mostly observed on the north and north east slopes of Beinn Hulabaidh, and on the north facing slope of a ridge approximately 1 – 1.5km to the east of Beinn Hulabaidh. However, although the features noted above can be indicative of historical peat slides, they can equally occur due to other processes, and no clear indications have been observed of peat slides having occurred on the Development Site in recent years. A previous peat depth survey report (Entec 2010) specifically noted that *"Peat landslides do not appear to have affected any of the existing roads and no evidence was found of slides affecting watercourses or lochs."*

Groundwater

11.5.28 The bedrock beneath the Study Area comprises low permeability (hydraulic conductivity) metamorphic and igneous rocks and are mapped as fractured, poorly productive strata. With the exception of potential cracks and fractures associated with the Outer Hebrides Thrust Zone, these strata offer very little potential for groundwater storage or transport due to their crystalline nature and minimal porosity. The estimated infiltration of the soil and geology in the Study Area is indicated on the BGS Hydrogeological Map of Scotland (1:625,000) to be less than 100mm per year. The estimated productivity rating for the aquifer (based on long-term groundwater yield recovered from an unspecified suitable abstraction borehole) is indicated to be less than 0.1 litres per second ("*very low productivity*", BGS/NERC, 2004). Groundwater in the underlying bedrock is likely to be largely restricted to a weathered shallow surface layer.

11.5.29 No drift aquifers have been mapped by BGS within the Study Area. However, the Study Area comprises peatlands which contain a perched water table at or close to the surface, lying above the underlying solid geology, and in hydraulic continuity with the surrounding surface waters.

11.5.30 Although no groundwater level data are available for the Development Site, during the January 2019 site visit the ground was wet and saturated in almost all areas. Even during the March 2011 site visit, when there was no significant rainfall, the water table in the peat appeared to be at or close to the surface across the majority of the Development Site.

11.5.31 In some flat areas there are considerable amounts of standing water; this is notably the case for an extensive area in the headwaters of the Allt Hogaraid (NGR NB 382 351), but also elsewhere. The driest areas that were visited during the surveys were on areas of outcropping bedrock, and along the ridges that constitute the north and south catchment divides for Feadan Loch Lochan e.g. NGRs NB 360 317 and 357 311 respectively. Even on these ridges, the water table in general would be expected to be close to the surface, probably within 0.5m of the surface, to support the bog habitats and maintain the peat. This is an expectation based on site characteristics (**Appendix 9H**), since the water table would be expected to remain within the acrotelm (the upper, more permeable layer of peat) in good quality peatland.

11.5.32 Some parts of the Development Site have been drained, particularly where forestry has been planted. However, in general the drainage is relatively ineffective, with the ground surface in-between drains often still being saturated.

11.5.33 Some assessment using field trials has previously been undertaken regarding the likely extent of influence of drainage for an area of North Lewis that encompassed the present Study Area (Enviros, 2005). Enviros monitored the distance from a peat face at cutting sites that experienced a reduction in water table level. In summary, the findings of the experiment included the following:

- Cutting through the peat resulted in the peat face in the immediate vicinity drying out by approximately 20% (i.e. the moisture content at the peat face reduced by 20%). The moisture content of different age cuttings was similar, indicating that any drying of a newly cut peat faces reaches equilibrium within a year; and
- No significant drying occurred more than 5m from the cut face. The majority of the effect was observed not more than 1m from the face.

11.5.34 Whilst the significance and correctness of those findings have been debated in critiques (Lindsay, 2005; Dargie, 2007), the small distance of influence is consistent with observations of attempted drainage for forestry already existing on the Development Site. The distances affected by drying are also comparable with the range considered by SGt (2011) in relation to calculating carbon loss from peatlands. However, it is recognised that no detailed investigations have been carried out within the Development Site.

11.5.35 Mapping information provided by BGS classifies the bedrock groundwater vulnerability across the majority of the site as 4b, with areas in the north west of the Development Site near Loch Garbhaig classed as 4a to 5 (in a scale from 1 to 5, where Class 5 is high vulnerability and Class 1 is low vulnerability). This assessment is made on the basis that infiltration through the solid geology occurs mainly through fracture zones, and that the overlying thicknesses of superficial drift deposits are very low or negligible i.e. a preferential pathway with very little retardation exists. It should be noted that the specific rating for the Study Area cannot be determined due to the scale and poor resolution of the groundwater vulnerability mapping referenced in this study. A copy of the Groundwater Vulnerability map has been provided in **Appendix 11B: Groundwater vulnerability map for Scotland**.

11.5.36 Source protection zones (SPZs) have not been defined in Scotland. However, all of Scotland's groundwater bodies have been designated as DWPAs and require protection for their current use or future potential as drinking water resources. DWPAs are defined as *"Bodies of water identified to be used, or intended to be used, for abstraction providing greater than 10 m^3 per day as an average, or serving more than 50 people; or waters intended for future use"*.

11.5.37 Groundwater quality data from a groundwater abstraction at Lews Castle (see later) indicates that the groundwater is of neutral pH with a relatively low level of mineralisation (a pH value of 6.8 and a conductivity of 268 µS/cm is recorded by CnES in its records of PWSs). This relatively low conductivity indicates a short residence time, which in turn infers that the source is shallow groundwater with low primary porosity.

Landfills

11.5.38 Bennadrove Landfill is situated in the northern part of the Development Site. Having observed the landfill from nearby, the site is of modern construction and appears to be a fully contained facility comprising lined cells with leachate collection and removal facilities. On this basis there is a low likelihood that the leachate generated from the landfill would have resulted in localised deterioration in groundwater quality. Surface water drainage is directed southwards into the Abhainn a Ghlinn Mhòir.

Springs

11.5.39 Although springs may be expected to emanate from shallow bedrock groundwater bodies, no such springs have been identified on the hydrogeological mapping within the Study Area. Only one discrete spring was observed during the site walkovers, outside the Development Site at NGR NB 396 315. This is immediately on the upslope side of the A859 carriageway and may only exist due to a previous lateral flowpath being interrupted by the road. Although the immediate area is generally flat, the spring is likely to emanate only shallow groundwater from lateral flows through the peat.

Watercourses (and Associated Lochs and Bog Pools)

11.5.40 The Study Area is intersected by three main fluvial catchment systems and a series of sub-catchments (see **Figure 11.5**). Each of the main and sub-catchments are discussed further below.

11.5.41 The largest of the fluvial catchments is the Abhainn Ghrioda. The Abhainn Ghrioda rises at an elevation of approximately 280m AOD to the north west of the Study Area. The total stream length from the source to the eastern boundary of the Study Area is approximately 17.7km, and the catchment area is approximately 43.4km^2. Beyond the Study Area, the Abhainn Ghrioda flows for a further 1.8km prior to discharging into Stornoway Harbour (Cala Steornabhaigh, NGR NB 419 318).

11.5.42 The Abhainn Ghrioda flows through two main lochs along its course (see **Figure 11.1**). The first, Loch an Ois (NGR NB 340 327), is located approximately 1km to the west of the Study Area, and the second, Loch a' Chlachain (NGR NB 364324), is located in the west of the Development Site. Several other lochs are located within tributary catchments of the Abhainn Ghrioda to the west of the Study Area and within the southern part of the Study Area.

11.5.43 A flow gauging station, operated by SEPA, is located on the Abhainn Ghrioda near the eastern boundary of the Study Area (NGR NB 403 325, see **Figure 11.6**). The key catchment statistics taken from the NRFA website are summarised in **Table 11.5**.

11.5.44 The Abhainn a' Ghlinn Mhòir is located to the north of the Abhainn Ghrioda (see **Figure 11.5**), adjacent to Pentland Road. It has a catchment area at the eastern boundary of the Study Area of 4.7km^2 and a stream length of 2.9km. Downstream it becomes known as the Bayshead River and flows for a further 3.8km beyond the eastern boundary of the Study Area to the immediate west of Stornoway, prior to discharging into Stornoway Harbour (NGR NB 422 329). The catchment includes Loch Airigh na Lic just to the east of the eastern Development Site boundary (NGR NB 400 342, **Figure 11.1**), and two small lochs on the western Development Site boundary.

Table 11.5 Abhainn Ghrioda NRFA Flow Gauge Statistics (1993-2017)

Characteristic/statistic	Value
Catchment area	43.4 km^2
Elevation	37 m AOD
Maximum altitude of catchment	277 m AOD
Mean flow	1.678 m^3/s
95% exceedance flow (Q_{95})	0.118 m^3/s
10% exceedance flow (Q_{10})	3.82 m^3/s

Data taken from the NRFA website on the 10th October 2018.

11.5.45 The very north part of the Study Area is located within the catchment area of the Abhainn Lacasdail (see **Figure 11.5**). The catchment includes Loch Garbhaig and its inflow and outflow, namely Allt Garghaig and Allt Loch Garbhaig, and also Allt a' Choire. At the eastern boundary of the Study Area, the Abhainn Lacasdail has a catchment area of 13.1km^2 and an approximate stream length of 5.3km. The Abhainn Lacasdail flows for a further 4.4km beyond the eastern boundary of the Study Area to reach the coastal mudflats north west of Stornoway Airport (NGR NB 430 347). The north bank of the Abhainn Lacasdail adjoins the bottom of gardens of several residential properties in Newmarket (NGR NB 4105 3559).

11.5.46 As noted, these main catchments can be separated into a number of sub-catchments, to allow tributaries and lochs to be identified more easily. Further sub-catchments are identified in **Figure 11.5**, namely those of Allt Hogaraid (Abhainn Lacasdail), Allt Hulabie and Allt Airigh na Beiste (including Loch na Beiste Bige) (Abhainn a' Ghlinn Mhòir), and the unnamed tributary from Loch a' Leadharain (including Loch a' Leadharain), the Feadan Loch Lochan (including Loch Speireag), numerous unnamed tributaries with many lochans further to the south of Feadan Loch Lochan (including Loch Druim nan Sgorach, Loch Uisg' an t-Solius, Loch Airigh Riabhach, Loch nan Sgiath, Loch Faoileag, Loch a' Bhuna, Loch Breugach, Loch Breag Cnoc a"Choilich) and the unnamed tributary from Loch Briodag (including Loch Briodagn and Loch Cnoc a" Choilich) (Abhainn Ghrioda). The boundaries between sub-catchments are often not clearly defined on the ground, due to gentle gradients and flat, saturated areas with standing water occurring on catchment divides.

11.5.47 The OS mapping does not show some smaller watercourses and preferential flow paths. The locations of such flow paths were partially identified using graphical information system (GIS) techniques on the 10m grid DTM to generate a topographic wetness index prior to visiting the Development Site and were confirmed whilst undertaking the site walkovers. That some watercourses and flow paths are not mapped is because the flows are intermittent or, alternatively, because flow occurs beneath the surface and can be seen on the surface only from slight topographic variation and linear variations in habitat (particularly illustrated by lines of Juncus grass).

11.5.48 Sub-surface flows within the peat are an important consideration and, whilst the most obvious of these were able to be identified based on topography and site observations, it is possible that other subsurface preferential flow paths could also exist.

11.5.49 Baseline flows for proposed watercourse and preferential flowpath crossings throughout the Development Site have been determined using the FEH Statistical Method and are presented in

Table 11.6. Photographs of the crossing locations taken during the 2019 walkover are presented in **Appendix 11C: Watercourse crossing photographs**.

Table 11.6 Baseline Flows at Proposed Watercourse and Preferential Flow Path Crossings

Crossing ID	Easting	Northing	Area (m^2)	Q95 (m^3/s)	FEH Baseline flows for varying return period events (m^3/s, for return periods in years)						
					2.33	5	10	25	50	100	200
RX6	136403	933806	297,873	0.001	0.45	0.54	0.65	0.81	0.95	1.11	1.26
RX7	138848	933957	1,875,747	0.014	5.77	7.91	9.51	11.9	14.01	16.45	19.31
RX8	137015	934033	1,237,200	0.004	1.85	2.53	3.05	3.81	4.49	5.27	6.18
RX9	137711	934178	1,003,215	0.003	1.9	2.6	3.13	3.91	4.61	5.41	6.35
RX21	137594	932824	596,000	0.002	0.54	0.68	0.82	1.03	1.23	1.46	1.77
RX26	137702	931998	2,638,758	0.009	3.32	3.98	4.81	6	7.03	8.23	9.35
RX27	135084	931673	338,991	0.001	0.51	6.14	0.74	0.93	1.08	1.27	1.44
RX28	137809	931718	1,683,026	0.006	2.22	2.66	3.22	4.02	4.7	5.5	6.26
RX29	137894	931610	469,493	0.012	5.72	6.85	8.30	10.31	12.08	14.18	16.11
RX30	138677	934569	74,739	<0.001	0.11	0.14	0.16	0.2	0.24	0.28	0.32
RX31	138950	933660	15,440	<0.001	0.02	0.02	0.03	0.04	0.05	0.06	0.06
RX32	139081	933483	43,009	<0.001	0.06	0.08	0.09	0.12	0.14	0.16	0.18
RX33	140143	933213	100,993	<0.001	0.15	0.18	0.22	0.27	0.32	0.37	0.43
RX34	139149	933245	323,351	0.001	0.49	0.59	0.71	0.88	1.03	1.21	1.37
RX35	138743	933175	22,807	<0.001	0.03	0.04	0.05	0.06	0.07	0.09	0.1
RX36	138363	931417	394,046	0.001	0.60	0.71	0.86	1.07	1.26	1.47	1.67
RX37	139300	931317	339,305	0.001	0.51	0.62	0.74	0.93	1.08	1.27	1.44
RX38	138539	931591	359,609	0.001	0.54	0.66	0.77	0.97	1.16	1.35	1.54
RX39	138410	933283	40,556	<0.001	0.06	0.07	0.08	0.11	0.13	0.15	0.17
RX40	138097	934916	100,336	<0.001	0.15	0.18	0.22	0.27	0.32	0.37	0.43
RX41	137559	931324	6,187,034	0.011	4.95	6.14	7.33	9.19	10.89	13.15	15.91

Since the baseflow analysis presented in the 2015 ES for the site (Amec Foster Wheeler, 2015), there have only been two alterations to the river crossings, with crossing RX21 being relocated upstream and an additional river crossing being introduced upstream of RX29, numbered RX41. Gauged daily flows were downloaded for the nearby NRFA station, Creed at Creed Bridge, from the year 1998 to 2017. They were then analysed to see if there had been any major flooding events in the years following the last FEH calculations in 2015. From inspecting the available data, it was observed that no major events were recorded by the NRFA from 2015 onwards. As a result, growth curves used in the 2015 analysis were considered fit for purpose in the 2019 analysis and hence are reproduced here. The hydrology at the revised locations was recalculated by area weighting of the flow values calculated in 2015 for the catchments RX21 and RX29.

11.5.50 There are numerous lochs within the Development Site and surrounding area, particularly to the south. The main lochs have been identified in the descriptions above of the individual sub-catchments. The outflows for some of the lochs were not shown on OS mapping but were identified during the site visits and have been included on **Figure 11.5**. There are also networks of bog pools, which are in general located in areas of flat, indistinct topography, without clear outflows.

11.5.51 Operational surface water quality monitoring is undertaken by SEPA at two locations close to the Development Site. In addition, SEPA undertakes investigative monitoring as and when required, which historically has covered other locations in the area (as shown in **Figure 11.6**). The scope of this monitoring is summarised in **Table 11.7**, whilst the results of the operational monitoring are summarised in **Table 11.8**.

11.5.52 The SEPA Allt na Craoibhe and Loch Leiniscal monitoring locations are approximately 2km to the south east and south respectively of the Development Site. The monitoring yielded average conductivities and pH typical of surface water, namely between 121.69 and 137 µS/cm at 25°C and between 6.33 and 6.55 respectively. pH and conductivity values follow a seasonal pattern with lows observed in the winter months. The surface water showed low levels of nitrogen and phosphorus and nitrate values remained below 0.21 mg/l and 0.87 mg/l respectively. The dissolved oxygen values varied across the year but showed an increasing trend up to 14.6 mg/l in a sample taken on the 26th March 2013. There was no indication of anthropogenic inputs within the surface water quality results and metal concentrations were low, although an aluminium concentration of 1190 µg/l was recorded on 30th November 2009.

11.5.53 The Applicant has also undertaken water quality sampling at the Development Site. For example, sampling took place between January and March 2011 following consultation with SEPA and Marine Science Scotland (MSS) at four locations on the Development Site, namely one on each of the Abhainn Lacasdail and Abhainn a' Ghlinn Mhòir and two on the Abhainn Ghrioda. Four samples were collected at each location between January and March 2011 and analysed in the laboratory for a wider range of determinands. A summary of the results for 2011 is provided in **Table 11.9**, with water quality trends plotted in **Appendix 11D: Applicant Historic Water Quality Data**.

Table 11.7 Summary of SEPA Water Quality Monitoring

Location	NGR	Description of Data
Allt na Craoibhe B897	NB 39347 29124	Operational monthly surface water quality data between 2003 to 2013 (time series is not complete - monthly data missing within most years, particularly 2003, and annual data missing from for 2011 and 2012). Includes field measurements, some metals and major ions.
Loch Leiniscal A859	NB 37205 29321 and NB 37042 29263	Operational monthly surface water quality data between 2000 to 2018 quarterly monitoring of field measurements (time series is not complete – data missing between January 2008 and mid-2011). Includes some metals and major ions.
Bennadrove Landfill	NB 393 342	Water quality data from eleven sampling locations within the Development Site, on discharge points and tributaries and on the Abhainn a' Ghlinn Mhòir (upstream and downstream). Sampling of river water, final effluent discharge and some surface water and waste leachate is included within the dataset. Although sampling has not occurred quite every month, the dataset timeseries runs from 1992 to the end of 2017.

Table 11.8 Summary of SEPA Operational Water Quality Sampling Results

Determinand	Allt na Craoibhe: Data period 2003-2013				Loch Leiniscal: Data period 2000-2018			
	Count	Mean	Min	Max	Count	Mean	Min	Max
Al (µg/l)	25	65.384	28.500	253.000	20	118.150	27.300	1190.000
Alk as CaCO3 (mg/l)	80	3.617	0.309	8.910	43	7.248	2.490	20.900
Ammonia as N (mg/l)	66	0.019	0.005	0.055	38	0.012	0.005	0.030
BOD (ATU) (mg/l)	11	0.660	0.290	1.200	35	1.057	0.440	4.200
Ca (mg/l)	29	2.028	1.360	3.640	20	2.504	1.190	4.900
Chloride (mg/l)	44	31.711	18.700	79.300	40	35.148	17.900	52.900
Elec Cond-25 (µS/cm)	28	121.689	77.100	271.000	40	137.070	68.600	206.000
Fe (mg/l)	24	0.701	0.285	1.300	19	0.673	0.246	1.960
Hardness (mg/l)	18	19.139	9.900	36.000	9	19.756	10.400	24.800
K (mg/l)	29	0.576	0.200	0.941	20	0.792	0.458	3.070
Mg (mg/l)	29	2.157	1.460	3.680	20	2.400	1.160	3.890
Mn (mg/l)	25	0.046	0.023	0.107	20	0.034	0.016	0.073
Na (mg/l)	29	15.889	9.510	25.400	20	17.676	9.610	25.000
Nitrate as N (mg/l)	66	0.094	0.001	0.872	39	0.096	0.030	0.200
Nitrite as N (mg/l)	66	0.007	0.002	0.100	39	0.004	0.002	0.009
N as NH3 (mg/l)	26	0.001	0.000	0.005	36	0.001	0.001	0.001
O2 - DO (mg/l)	31	10.367	0.200	14.400	39	10.953	0.200	14.600
O2 -%sat (%)	31	91.952	5.000	148.000	39	95.185	5.000	114.000
pH (pH units)	83	6.329	5.440	7.070	43	6.553	5.820	7.580
RP as P (mg/l)	65	0.012	0.003	0.212	40	0.011	0.008	0.033
SampleTemp (°C)	32	10.259	2.200	16.900	39	9.838	1.800	19.800
Sulphate as SO4 (mg/l)	31	3.506	0.110	11.400		-	-	-
Susp Solids (mg/l)	29	2.303	1.000	5.000	36	2.004	1.000	10.700
TOC (mg/l)	26	11.076	4.650	17.848	-	-	-	-
TON as N (mg/l)	50	0.114	0.030	0.880	39	0.098	0.030	0.201
Zn (µg/l)	9	5.729	4.000	7.270	20	118.150	27.300	1190.000

Note: All data includes non-detect values

Table 11.9 Summary of Applicant's Water Quality Sampling Results, 2011

Determinand	Abhainn Lacasdail (AH1)	Abhainn a' Ghlinn Mhòir (AM1)	Abhainn Ghrioda (AG1, downstream)	Abhainn Ghrioda (AG2, upstream)
Field data				
Temp (°C)	4.6	4.2	4.4	4.6
pH	7.4	7.0	7.5	8.6
Elec Cond (µS/cm)	162.4	178.1	156.0	156.1
O2 -%sat (%)	108.2	107.3	109.5	108.3
O2 - DO (mg/l)	13.6	13.7	13.8	13.7
Lab data				
Cl (mg/l)	218	240	240	253
BOD, as O_2 (mg/l)	2.9	3.1	>42.1	2.3
Organic Carbon, as C (DOC) (mg/l)	5.6	5.9	13.4	5.6
Al (mg/l)	0.022	0.017	0.022	0.022
Ca (mg/l)	125.0	123.5	136.8	136.1
Mg (mg/l)	210.5	224.8	194.3	195.5
Turbidity (NTU)	0.7	0.4	1.0	1.0

Note: Results are the average of 4 samples collected by the Applicant between January and March 2011. For BOD, values for 10th February 2011 only

11.5.54 Looking at the results behind this summary table, the pH for the samples collected in 2011 varied between a minimum of pH 5.4 on the Abhainn a' Ghlinn Mhòir on 10th February 2011 to an apparent maximum of pH 9.5 at the upstream location on the Abhainn Ghrioda on 9th March 2011. The difference between catchments may be due to the difference in topography and peat thickness, the Abhainn a' Ghlinn Mhòir sampling point being within a broad flat valley with slow moving water on top of possibly thick peat. The pH also varied within catchment, with for instance a significantly higher pH at the upstream end of the Development Site on the Abhainn Ghrioda compared to downstream. This may be due to the upper reaches being dominated by areas of thinner peat and more exposed bedrock, compared to the occasional deep peat of the Development Site.

11.5.55 Water quality field monitoring was undertaken on the Development Site on behalf on the Applicant during the site walkover in January 2019. The monitoring locations are shown in **Figure 11.6** and a summary of the results is presented in **Table 11.10**.

Table 11.10 Applicant Average Water Quality Field Monitoring Results, January 2019

Catchment	Number of sampling points	Temp °C	pH	Conductivity µS/cm^2	Redox mV	Total Dissolved Solids mg/l	Dissolved Oxygen %
Abhainn Lacasdail	4	6.43	7.40	103.67	45.17	9.33	76.17
Abhainn a' Ghlinn Mhòir	7	10.02	7.46	139.57	44.86	11.22	102.21
Abhainn Ghrioda	12	7.27	7.42	120.58	44.84	12.51	108.83

Notes: Water quality field monitoring data have been averaged for each catchment. A water quality result from the unnamed tributary from Loch a' Leadharain to the Abhainn Ghrioda was omitted due to abnormally high conductivity readings due to the salt inputs into the drainage from the local road salt store ~450 m to the north west (see later).

11.5.56 The field data in **Table 11.10** shows consistent neutral pH between catchments, averaging 7.4. The lack of variation between catchments, contrary to that recorded in 2011 (see **Table 11.9**), might be because of the weather conditions that prevailed during the 2019 monitoring, with precipitation and snow melt diluting any characteristic water quality signatures. Looking at the data in more detail, the downstream monitoring points usually show a relatively neutral pH, whilst typically run-off from peat might be expected to be of a lower (more acidic) pH. The results could therefore be indicative of a surface run-off dominated system with relatively little disturbance to the peat. Other field water quality measurements collected during the January 2019 survey, such as conductivity and redox, suggest possible differences between the catchments based on these parameters.

11.5.57 The data collected to date indicates high oxygen saturation. The SEPA operational data presented in **Table 11.8** suggest that the percentage of dissolved oxygen can fall in summer, but that the average is close to or greater than 100%. This was confirmed at most locations during the January 2019 survey, although the Abhainn Lacasdail catchment average of 76% was lower possibly due to lower energy nature of the reaches within the drainage system visited.

11.5.58 The water quality monitoring results presented above is broadly indicative of a high quality water environment, suitable for fish populations. However, there are several existing influences on water quality, and those observed during the 2019 site visit include the un-bunded Marybank road salt store at the start of the main northern access track; the Bennadrove Landfill site which, although contained to prevent groundwater contamination and manage run-off, results in rubbish being blown to areas to the north, particularly into the Allt Hogaraid; and run-off from a go-cart track alongside the A859 (at NGR NB 395 313, and probably collected within ditches along the road side).

11.5.59 During the January 2019 site walkover, drainage from below the salt store (NGR NB 403 331) gave a conductivity in excess of 14,000 µS/cm^2. After tracing the discharged water into the wider catchment, conductivities were again found to be elevated, greater than 1000 µS/cm^2, within the unnamed tributary (NGR NB 405 327) from Loch a' Leadharain to the Abhainn Ghrioda (some 450m to the south east of the discharge).

11.5.60 Furthermore, the results of the previously mentioned SEPA river monitoring on the Abhainn a' Ghlinn Mhòir to the south of the Bennadrove Landfill have been provided by SEPA and are summarised in **Table 11.11.**

Table 11.11 Summary of SEPA Abhainn a' Ghlinn Mhòir Water Quality Sampling Results (1992 – 2017)

Determinand	Count	Mean	Min	Max
Al <0.45µm (µg/l)	30	70.46	18	150
Alk as CaCO3 (mg/l)	179	27.16	0.567	364
Ammonia as N (mg/l)	346	1.03	0.005	18.61
As <0.45µm (µg/l)	140	1.05	0.15	2.75
Ca (mg/l)	75	18.01	0.784	244
Cd <0.45µm (µg/l)	130	0.02	-0.012	0.15
Chloride (mg/l)	224	58.03	6.4	883
Co <0.45µm (µg/l)	26	0.41	0.16	1.01
COD (mg/l)	92	57.00	6.6	199
Cr <0.45µm (µg/l)	142	2.56	0	56.4
Cu <0.45µm (µg/l)	133	3.10	0.13	63.2
Elec Cond-25 (µS/cm)	135	445.57	73.4	3820
Fe <0.45µm (mg/l)	34	0.69	0.04	1.72
Hg (µg/l)	127	0.49	0.005	5.33
K (mg/l)	75	12.03	0.229	119
Mg (mg/l	75	7.63	1.31	54.2
Mn <0.45µm (mg/l)	33	0.02	0.005	0.0577
Na (mg/l)	75	48.77	9.24	342
Ni <0.45µm (µg/l)	140	2.62	0.574	35.7
Nitrate as N (mg/l)	211	17.47	0.0014	237
Nitrite as N (mg/l)	213	0.03	0.0016	1.07
N as NH3 (mg/l)	139	0.00	0	0.155
O2 -%sat (%)	191	92.06	0	124
Pb <0.45µm (µg/l)	140	0.29	0.042	5.34
pH (pH units)	322	6.79	3.81	8.38
RP as P (mg/l)	260	0.05	0.0035	0.985
Sn <0.45µm (µg/l)	1	0.29	0.29	0.29
Susp Solids (mg/l)	314	13.86	1	2480
TP as P (mg/l)	12	0.25	0.0076	0.966

Determinand	Count	Mean	Min	Max
V <0.45µm (µg/l)	138	0.48	0.07	2.64
Zn <0.45µm (µg/l)	135	6.63	1.54	62.5

Flood Risk

11.5.61 In accordance with SPP 254-268: Flooding and Drainage, prospective developers should take flood risk into account before committing themselves to a site or project. Developments that would have a significant probability of flooding or that would increase the probability of flooding elsewhere are unlikely to be permitted. Flood defences in the Development Site and elsewhere are the responsibility of CnES, the lead local flood authority. The CnES response to a data request indicates that it is unaware of any flood defences along the rivers within or downstream of the Development Site.

11.5.62 In terms of flood risk to, and arising from a Proposed Development, the following sources of flooding have been considered:

- Fluvial;
- Tidal;
- Groundwater;
- Artificial drainage systems; and
- Other sources such as overland flow and as a result of failure of artificial water bodies such as reservoirs and canals.

11.5.63 The fluvial flood baseline is shown in **Figure 11.7** for the 1 in 200 year extent (SEPA website flood maps). SEPA also notes that there are a number of small watercourses within the Development Site, and as the catchments of these small watercourses are less than 3km^2 they have not been modelled for the SEPA flood map but may still pose a flood risk to the area of interest.

11.5.64 SPP (2014) states that development in the 1 in 200 year fluvial flood zone should be avoided. **Figure 11.7** shows that the flood extents are generally confined to relatively narrow margins along the length of the channels with no zones of extended inundation. The majority of the Development Site is located outside of the 1 in 200 year flood zones and no infrastructure is planned within the 1 in 200 year flood zones, other than at certain proposed access track crossings.

11.5.65 SEPA 's responses to data requests indicates that it has no records of flooding affecting the Development Site. In the wider area further downstream, it has 23 records of flooding at various dates between December 1875 and February 2014, with 20 of these being associated with coastal flood events and one pluvial flood event around Stornoway Harbour. Information derived from SEPA shows records of a flooding event of a property next to the bridge in Laxdale, near Guershader (assumed to be near NGR NB 424 351) in 2000. In addition, a reservoir embankment breach as a result of heavy rainfall was recorded at Loch Airigh na Lic.

11.5.66 Part of the Development Site lies within the Stornoway Potentially Vulnerable Area (PVA 02/02), described within http://apps.sepa.org.uk/frmstrategies/pdf/pva/PVA_02_02_Full.pdf. This PVA is located in the east of the Isle of Lewis and extends from Stornoway across the Eye Peninsula and covers an area of approximately 57km^2. This area is associated predominantly with coastal flooding and with river flooding from the Abhainn a Ghlinn Mhòir.

11.5.67 There is no tidal flood risk to the Development Site, as minimum elevations at the Development Site exceed 50m AOD.

11.5.68 As noted earlier, groundwater levels are at or near to the surface across the majority of the Development Site, and thus it is expected that localised groundwater flooding does take place.

11.5.69 Overland flow is likely to occur during heavy rainfall due to the high propensity for saturated ground conditions. The local topography will influence which areas are prone to flooding from overland flow. Small areas of surface water flooding of low to high likelihood are indicated on the SEPA Flood Map associated with lochs and lochans.

11.5.70 While there are no reservoirs or canals near the Development Site, there are a number of lochs and lochans. However, no embanked sections at the loch margins have been observed, and thus the risk of loch banks breaching is negligible.

WFD Water Bodies

11.5.71 The Study Area is contained within the Scotland RBMP, which describes the SGt's implementation of the WFD. The RBMP describes the 'status' of all water bodies over a specific size and identifies any measures that are required to bring water bodies to 'Good Ecological Status' if they are not already achieving it. The RBMP includes river water bodies with catchments greater than 10km^2, and lochs of more than 50ha.

11.5.72 The Scotland RBMP identifies three river water bodies, one loch and one groundwater body within or adjacent to the Study Area. The many smaller burns and lochans within the area are not explicitly included in the RBMP but still fall within the remit for SEPA's management of the water environment.

11.5.73 A summary of the RBMP water bodies within or adjacent to the Study Area is provided in **Table 11.12** and copies of the water body sheets can be found in **Appendix 11E: Relevant water body sheets from the Scotland RBMP**. This shows that these water bodies are currently at either Good or High (including morphology) status. It is a requirement of the WFD that the status must not deteriorate from the existing status where this is already Good or High. This means that no pressures must be introduced to the water body or its catchment (physical, chemical or biological) that would cause the status of the water body to deteriorate.

11.5.74 The Loch Orasaig water body is classed as a Heavily Modified Water Body (HMWB) in relation to its use for water supply. Pressures have been identified on the water body in relation to flow regulation and abstraction. The status of the loch is Good (overall and morphology). The loch is located ~2.5km to the south east of the Study Area, beyond the intervening Allt na Craoibhe water body.

Table 11.12 Scotland RBMP Water Bodies within or Adjacent to the Study Area

Water body name	Waterbody ID	Length (area where appropriate)	Typology	Current overall status (morphology)	Objective overall status (long-term)
Abhainn Lacasdail	20750	10.73 km	Lowland; small; organic	Good (High)	Good (High)
Abhainn Ghrioda	20753	18.64 km	Lowland; small; organic	High (High)	High (High)
Allt na Craoibhe	20754	9.49 km	Lowland; small; organic	Good (High)	Good (High)
Loch Orasaigh	100054	0.64 km^2	Lowland; large; medium alkalinity; deep	Good (Good)	Good (Good)
Lewis and Harris groundwater body	150695	2108.90 km^2	n/a	Good	Good

Source: https://www.sepa.org.uk/data-visualisation/water-environment-hub/

Abstractions

11.5.75 Information on licensed abstractions and discharges within and close to the Study Area was requested from SEPA. A summary of the relevant abstraction information received is summarised in **Table 11.13**.

11.5.76 As shown in **Table 11.13**, there is only one abstraction in the vicinity of the Study Area that requires a licence under the CAR. Scottish Water has a surface water abstraction, with associated water treatment works, at Loch Orasaigh. An approximate catchment area has been estimated based on the OS mapping (as shown in **Figure 11.8**). The catchment area is relatively small, in general extending only approximately 200m from the loch shore, with a maximum of around 700m. The entire catchment area is to the south east of the A859 and does not extend to the Development Site.

11.5.77 In addition, there are two small abstractions registered with SEPA that are below the threshold requiring a licence ($10m^3/d$). These are for Marybank Quarry (from a borehole) and the Creed Hatchery (from the Abhainn Ghrioda). Both of these sites are still active registrations, although SEPA was not able to confirm whether they are currently being used. Whilst the Creed Hatchery has an extensive catchment up the Abhainn Ghrioda, the Marybank groundwater catchment will be very limited in extent, certainly no greater than the maximum 250m buffer zone recommended for groundwater abstractions in SEPA Land Use Planning System Guidance Note Number 31 (LUPS-GU31) and shown in **Figure 11.8**.

11.5.78 The locations of PWSs (which are not licensed by SEPA but whose records are required to be kept by the local authority) were investigated by an internet search on the CnES online database of registered PWSs and validated by an enquiry to CnES by email. Information received regarding two PWSs is summarised in **Table 11.13**. The PWS closest to the Development Site is that from Loch Lathamul supplying the Druim Dubh property (NGR NB 390 307). The abstraction is believed to occur from the west end of the loch and is assumed to then be pumped up the hill to the west to the property (although this could not be verified during the January 2019 walkover). The catchment area of Loch Lathamul is predominantly to the west of the loch, as shown in **Figure 11.8**. The unnamed inflow is to the western extremity of the loch, having previously flowed along the southern edge of the A859, and passing under the road through a culvert approximately 200m upstream. However, previous information has suggested that the PWS source is actually Loch Beag na Craoibhe, approximately 1.5km south west of Loch Lathamul and further away from the Proposed Development.

Table 11.13 Abstractions in the Vicinity of the Study Area

Licence number	Licence holder	Location	Grid ref	Quantity	Comments
Licensed surface water abstractions					
CAR/L/1012772	Scottish Water	Loch Orasaigh	NB 39430 28680	3404m^3/d	
CAR-registered abstractions					
n/a- GBR	Marybank Quarry	Marybank Quarry	NB 40620 33010	< 10m^3/d	Not confirmed as active by SEPA
n/a- GBR	Creed Hatchery	Abhainn Ghrioda at Creed Bridge	NB 40212 32495	< 10m^3/d	Not confirmed as active by SEPA
PWSs					
n/a	Mr Cameron, Druim Dubh	Loch Lathamul	NB 39045 30749	N/A	An unregulated supply to Druim Dubh, Lochs Road, Isle of Lewis HS2 9JW (NB 38344 30507). The property is currently unoccupied. Older record suggests abstraction is from Loch Beag na Craoibhe.
n/a	Stornoway Trust	Iron Well, Lews Castle grounds	NB 41305 32192	unknown	A regulated supply in which the Stornoway Trust has indicated by means of public notice that this supply is not to be consumed by the public.

11.5.79 Few details are available for the Lews Castle PWS. For such a small groundwater abstraction, the SEPA LUPS-GU31 250m buffer zone is a suitable surrogate for its catchment, as shown in **Figure 11.8**.

11.5.80 SEPA has also provided information on the locations of other CAR licences, including discharges, impoundments and other engineering structures. These are shown in **Figure 11.8**. There are discharges associated with properties and industry along the A859, and all of these are outside the Development Site, with the exception of a discharge from an existing oil interceptor at the Marybank salt store.

11.5.81 There is one impoundment within the Development Site, on the outflow from Loch a' Chlachain to Abhainn Ghrioda (NGR NB 36726 32334). The information from SEPA indicates that the impoundment is 1m high and will have some influence on flows in the Abhainn Ghrioda downstream and on water levels in Loch a' Chlachain itself.

Conditions Supporting Groundwater-Dependent Terrestrial Ecosystems

11.5.82 The habitats present on the Development Site are described in detail in **Chapter 9**. The Development Site consists of a mosaic of peat bog and heath habitats, although with some more disturbed habitats in areas of forestry and peat cuttings. As noted, the entire Development Site is very wet, with the peat water table at or close to the surface, and the mosaic of habitats across the Development Site is dependent to a large extent on maintaining this level of wetness.

11.5.83 Water-dependent habitats are commonly regarded as groundwater-dependent terrestrial ecosystems (GWDTEs). However, whilst there are likely to be areas of the Development Site where the peat is of relatively higher permeability, or where fracture systems in the underlying bedrock allow increased movement of groundwater, peat is generally of low permeability, and much of its water is instead likely to be local rainfall, impeded by poor drainage. Whether habitats are supported by locally derived rainfall or 'true' groundwater from a wider catchment is not just an academic concern, because the origin of the 'groundwater' supporting a wetland has relevance with respect to the EIA of peat-based wetlands in terms of determining a relevant Zone of Influence (ZoI, otherwise known as a zone of contribution or catchment) for the assessment.

11.5.84 However, there is a well-established means in Scotland to identify true GWDTEs whose water supply could potentially be affected by a development. Appendix 4 of SEPA's LUPS-GU31 uses a modified list of National Vegetation Classification (NVC) communities developed by the United Kingdom Technical Advisory Group (UKTAG, 2009) to help determine the possible groundwater dependence of habitats. LUPS-GU31 100m and 250m 'buffers' can then be applied to these remaining habitats to identify which are sufficiently close to proposed infrastructure (most typically turbine foundations, access tracks and borrow pits) for their water supplies to be potentially affected (or, alternatively, the buffers can be applied to the relevant infrastructure). Finally, site-specific information regarding a site's topography, geology and hydrogeological characteristics is used to determine the 'true' groundwater dependence of habitats located within these buffers.

11.5.85 The potential GWDTEs that have been identified are shown in **Figures 11.9a-e,** and those located within the infrastructure buffers shown on this figure series are considered individually in **Table 11.14**. The rows in bold in **Table 11.14** are those where the habitat has been concluded to have a 'true' high or moderate dependency on groundwater i.e. habitats 1, 5 - 13 and 22 - 25. These sites have been selected based on their geology and location on sloping ground, with an associated upstream topographic catchment area (potential groundwater catchment). The rationale is presented in more detail in **Appendix 11F: GWDTE Risk Assessment**.

Table 11.14 Identification of Areas of GWDTEs

Area No.	NVC	Brief description	SEPA groundwater dependency	Assessed groundwater dependency
1	**M25a**	**Small area associated with the Abhainn Ghrioda. Likely to be maintained by throughflow on. Steeply sloping peat valley sides to south.**	**Moderate**	**Moderate**
2	M15b	Small area lying close to small tributary of Abhainn Ghrioda on elevated ground. Probably fed by direct precipitation since there is no obvious surface water or groundwater catchment.	Moderate	Low
3	M23b	Lies on catchment divide at Cnoc a' Choilich n elevated ground. Likely to be rainwater dominated with a minimal surface or groundwater catchment.	High	Low
4	M25a	A flat area with numerous pools and deep peat. Likely to be rainwater dominated with a minimal surface or groundwater catchment.	Moderate	Low
5	**M15b**	**South and adjacent to Pentland Road on sloping ground. Whilst potential catchment is small, peat throughflows from the south might help support the habitat.**	**Moderate**	**Moderate**

Area No.	NVC	Brief description	SEPA groundwater dependency	Assessed groundwater dependency
6	**M15b**	**South and adjacent to Pentland Road, on north slopes of Cnoc Loch an Leadharain. Reasonably sized catchment above it, and peat throughflows from the south might help support the habitat.**	**Moderate**	**Moderate**
7	**M25a**	**South west of Loch a' Leadharain, on catchment divide. Whilst the potential catchment is small, peat flows from the south west might help support the habitat.**	**Moderate**	**Moderate**
8	**M15b**	**Habitat area extends from catchment divide downslope to Loch a' Leadharain. Whilst the potential catchment is small, peat throughflows from the north west might help support the habitat.**	**Moderate**	**Moderate**
9	**M15c**	**Adjacent to tributary of Abhainn Ghrioda. Reasonably sized catchment above it to the north, and peat throughflows might help support the habitat.**	**Moderate**	**Moderate**
10	**M6ci**	**On the north east banks of Loch a' Leadharain. Supported by peat throughflows in the reasonably sized catchment to the east.**	**High**	**High**
11	**M15c**	**On slopes of Cnoc Loch a' Leadharain. Reasonably sized catchment above it, and peat throughflows from the north might help support the habitat.**	**Moderate**	**Moderate**
12	**M15c**	**On catchment divide at Cnoc Loch a' Leadharain. Whilst the potential catchment is small, peat throughflows from the south might help support the catchment.**	**Moderate**	**Moderate**
13	**M15b**	**Linear strip along southern edge of Bennadrove Landfill. The habitat has a large catchment to the north within the landfill boundary, but throughflows are still possible though.**	**Moderate**	**Moderate**
19	M15b	Very small area close to tributary of Abhainn Ghrioda. Likely to be rainwater-dominated with a minimal surface or groundwater catchment, although surface water runoff over outcrops could also supply this habitat.	Moderate	Low
20	M25a	Linear area running along valley bottom, forming start of watercourse leading to Loch Speireag. Supported by limited peat throughflows from a very small catchment.	Moderate	Low
21	M6c	Patch of M6c lying to the east of Cnoc Loch a' Leadharain. Likely to be rainfall-dominated with a minimal surface or groundwater catchment.	High	Low

Area No.	NVC	Brief description	SEPA groundwater dependency	Assessed groundwater dependency
22	**M6ci**	**Small area on the banks of the Allt Hulabie, at its southern extent. Supported by a large surface water and groundwater catchment.**	**High**	**High**
23	**M6ci**	**A linear area lying along the banks of the Abhainn Lacasdail along the northern boundary of the Proposed Development. Supported by peat throughflows in the small but very steeply sloping catchment to the south.**	**High**	**High**
24	**M15b**	**A narrow area fringing the south western edge of Loch Garbhaig. Supported by peat throughflows in the large catchment to the south west.**	**High**	**Moderate**
25	**M15b**	**On the south facing slope of Beinn Hulabaidh. Associated with the Allt Airigh na Beiste, but is supported by peat throughflows in the large steeply sloping catchment to the north.**	**Moderate**	**Moderate**
26	M25a	Linear area on the banks of the Allt Greidaig, north of Pentland Road. Supported by limited peat throughflows from a very small catchment.	Moderate	Low
27	M15b	Linear area associated with a change in slope and the flood plain of the Abhainn Ghrioda. Supported by limited peat throughflows from a very small catchment.	Moderate	Low
28	M6ci	Small patch of M6 on the inside of a tight meander on the Abhainn Ghrioda, just downstream of Loch a' Chiachain. Supported by limited peat throughflows from an indistinct catchment.	High	Low

Note: The GWDTE numbering is based on previous 2015 EIA (Amec Foster Wheeler, 2015). GWDTEs 23 - 28 are additional GWDTEs identified from buffers associated with the current wind farm design.

Conditions Supporting Designated Conservation Sites

11.5.86 There are a number of designated statutory and non-statutory conservation sites within and downgradient of the Study Area, and the location of those considered water-dependent are shown on **Figure 11.1**. The habitats are summarised below but are described in detail in **Chapter 9**.

11.5.87 The Lewis Peatlands Ramsar and Special Protection Area (SPA) is an extensive area of deep blanket bog, interspersed with rain-fed bog pool complexes and freshwater lochs, and lie immediately to the north and west of the Development Site. The vast expanse of this relatively undisturbed peatland landscape supports a diverse range of associated flora and fauna, including a diverse population of breeding waterfowl. Small depressions within the peatland are subject to a flow of water carrying nutrients dissolved from rock and mineral soil. With their north-westerly and island location, the Lewis Peatlands are probably the most extremely 'Atlantic' of all the blanket mires in Great Britain.

11.5.88 The Lewis Peatlands Special Area of Conservation (SAC) is a blanket bog with a priority habitat located to the north west of the proposed site. The SAC is 960m to the south of the Development Site boundary at its nearest point. It contains qualifying habitats of acid peat-stained lakes and ponds, clear-water lakes or lochs with aquatic vegetation, depressions on the peat substrates and wet heathland with cross-leaved heath.

11.5.89 Tong Saltings SSSI is located approximately 3.5km north east of the Development Site. The SSSI contains one of the largest areas of saltmarsh and tidal flats in the Outer Hebrides and is the best representative intertidal system on the eastern seaboard. Lying at the confluence of two river estuaries, including the mouth of the Abhainn Lacasdail, the intertidal flats have plentiful invertebrate fauna and grade into saltmarsh and Calluna heath. The notified natural features include coastal mudflats, saltmarsh and sand dunes. The SSSI is also important for wintering and breeding birds.

Future Baseline

11.5.90 Land use and climate change could affect the Study Area in the future and needs to be taken into account when assessing the effects of the later operational and decommissioning phases.

11.5.91 Parts of the Development Site have already been used for peat cutting, and this is an ongoing use. It is likely that peat cutting would extend into other parts of the Development Site over time, resulting in minor modifications to the near-surface hydrological flow paths.

11.5.92 The conditions at the Development Site would be affected by the likely influence of climate change in the future, which could affect the amount and intensity of rainfall, and temperature and evapotranspiration. The UK Climate Projections 2018 (UKCP18) include predictions for the Isle of Lewis within those for the north of Scotland. The central estimate under a medium emissions scenario predicts an increase in annual mean temperature of 1 - 2°C by the end of the 2050s. The medium emissions scenario also has a central estimate of a 10 - 20% decrease in summer precipitation, with an increase of 10 - 20% in winter, by the end of the 2050s. This could change the hydrological characteristics of the Development Site and wider catchment areas over time.

11.6 Consultation

11.6.1 **Table 11.15** provides a summary of the issues about the Proposed Development that have been raised by consultees and the relevant section of this chapter where this is considered.

Table 11.15 Summary of Issues Raised during Consultation Regarding Geology, Hydrology and Hydrogeology

Issue raised	Consultee(s)	Consultee comment	Applicant response for water elements
Advice to the planning authority – required information	SEPA	The following key issues must be addressed in the Environmental Impact Assessment process. To avoid delay and potential objection, the information outlined below and in the attached appendix must be submitted in support of the application. a) Map and assessment of all engineering activities in or impacting on the water environment including proposed buffers, details of any flood risk assessment (FRA) and details of any related CAR applications. b) Map and assessment of impacts upon GWDTE and buffers. c) Map and assessment of impacts upon groundwater abstractions and buffers. d) Peat depth survey and table detailing re-use proposals. e) Map and table detailing forest removal. f) Map and site layout of borrow pits. g) Schedule of mitigation including pollution prevention measures. h) Borrow Pit Site Management Plan of pollution prevention measures. i) Map of proposed surface water drainage layout. j) Map of proposed water abstractions including details of the proposed operating regime. k) Decommissioning statement.	The assessment of effects is presented in **Section 11.10** and **Section 11.13**, with relevant map information provided in the **Figure 11.9** series (engineering activities, buffers, GWDTEs, borrow pits) and **Figure 11.10** (buffers, abstractions, peat depths). Agreed with SEPA (see below) that no formal FRA required at this stage. No extensive forest removal proposed. Schedules of mitigation are presented in **Section 11.8** (embedded) and **Section 11.12** (additional). The Applicant proposes that detailed design information, such as surface water drainage layout and proposed abstractions, and plans, such as Site Management Plans and any decommissioning statement, are conditioned.
Site-specific comments – turbine location	SEPA	Turbines and other infrastructure should be located to ensure a suitable buffer between the top of the banks of watercourses and lochs and excavations; this is usually a minimum of 50 m. In relation to the layout outlined in the scoping report the following modifications would be required: • Turbine 9 (T9) should be relocated to ensure a suitable buffer to the top of the bank of the Feadan Loch Lochan; • T14 should be relocated to ensure a suitable buffer to the top of the bank of Allt Hogaraid; • T28 will need to avoid the local bog pools; • T29 may need to be relocated further away from the Allt Greidaig to ensure that there are no high risk excavations in the functional flood plain.	50m watercourse buffers are discussed in **Section 11.8**. Turbine locations and numbers have been revised since scoping, and all SEPA turbine location concerns have been addressed.
Site-specific comments – peat probing	SEPA	Due to the change in layout from the existing consent then more peat probing data would be required prior to determination. The peat probing information should be used to ensure that the scheme that comes forward minimises impacts on deep peat; this should include reassessing aspects of the scheme layout which already has consent.	More peat depth data have been acquired; see **Section 11.5** and **Appendix 9H**. Avoidance of deeper peat is a key embedded mitigation measure, as described in **Section 11.8**.

Issue raised	Consultee(s)	Consultee comment	Applicant response for water elements
Site-specific comments – peatland restoration	SEPA	Once it has been demonstrated that the layout minimises impacts on peat as much as possible, mitigation measures such as floating track and piling should be implemented (and all shown on a plan). The application should include peatland restoration proposals to help compensate for the peat disturbance caused by the development; this could include, for example, restoration of local peat cuttings, if they do not have a cultural or historic interest.	Embedded mitigation such as track design is presented in **Section 11.8**. Turbine foundation design includes piled foundations where possible (See **Figure 4.4**) See also **Appendix 9H PMP** and **9I: Habitat Management Plan** (HMP).
Site-specific comments – track layout	SEPA	Careful consideration would need to be given to the layout of the tracks that connect the turbines as these can have just as significant an effect on the aspects of the environment in which we have an interest as the turbines. The track should be demonstrated to be as short as possible and SEPA is unlikely to support excessive use of spurs for example.	Embedded mitigation such as minimising track length is presented in **Section 11.8**.
Site-specific comments – GWDTE guidance	SEPA	SEPA is content with the proposal that no new NVC data is collected but that the presentation of the data will take into consideration its updated GWDTE guidance. SEPA welcomes the proposal for this information to form a separate appendix.	An updated GWDTE description is presented in **Section 11.5**, with the new GWDTE risk assessment presented in **Appendix 11F: GWDTE Risk Assessment**.
Site-specific comments – FRA	SEPA	In relation to flood risk SEPA welcomes the commitment that all crossings would be oversized to accommodate at least the 1 in 200 year flood event. In most cases it would be content for this element to be conditioned, however the EIA Report should include a FRA for the larger crossings such as the Abhainn Ghrioda and Abhainn a Ghlinn Mhòir, accompanied by supporting drawings of the proposed structures and approaching tracks, so the full scale of the engineering works required is understood.	Subsequent discussions between SEPA and Wood confirmed that SEPA is content with a high-level assessment at this EIA Report stage, looking at design flows and undertaking downstream impact assessment and mitigation, including advising suitable crossing types. SEPA assumes a commitment to accommodate 1 in 200 flood event, and the Applicant agrees and proposes that this requirement is conditioned. Design flows are presented in **Section 11.5**, assessment of effects are in **Section 11.10** and **Section 11.13**, and watercourse crossing types proposed in **Section 11.12**.
Site-specific comments – Bennadrove Landfill	SEPA	Turbine 12 and 33 are in close proximity to Bennadrove Landfill site. The EIA Report should include an assessment of the potential impacts of the development on the landfill and in particular on groundwater flows and pollutant pathways in this area, if necessary outlining proposed mitigation and monitoring. CnES can provide information on operation and historic use and on request, SEPA can provide information in relation to our licencing of the site. Due to SEPAs involvement with the landfill site it is aware of very deep peat in the vicinity of Turbine 33, and if this is the case where infrastructure is proposed then it should be relocated.	Turbine locations and numbers have been revised since scoping, and the new Turbines 21 and 30 (replacing Scoping Report Turbines 12 and 33) are both further away from the landfill, and avoid deep (> 3m) peat. The assessment of potential effects including on Bennadrove Landfill is presented in **Section 11.10**.

Issue raised	Consultee(s)	Consultee comment	Applicant response for water elements
Site-specific comments – battery storage	SEPA	Information should be provided on the bunding and drainage proposals from the battery storage facilities.	Embedded mitigation is presented in **Section 11.8**. Furthermore, battery storage would be located in the proposed primary substation building, the details of which would be submitted pursuant to the terms of a planning condition (see **Figure 4.10a**).
Site-specific comments – further discussions	SEPA	SEPA would welcome further pre-application discussion with the developer on this project prior to the application being submitted. It would especially welcome consultation on layout proposals and assessment results in relation to GWDTE and peat.	Consultation has taken place with consultees, including SEPA, over a number of months, and the design of the scheme has changed as a result of the meeting in November 2018.
Detailed scoping requirements - site layout	SEPA	The site layout must be designed to avoid impacts upon the water environment. Where activities such as watercourse crossings, watercourse diversions or other engineering activities in or impacting on the water environment cannot be avoided, then the submission must include justification of this and a map showing all proposed infrastructure overlain with all lochs and watercourses; a minimum buffer of 50m around these water bodies, with all breaches identified on a plan with an accompanying photograph, key dimensions and a drawing of the engineering works; and a detailed layout of all proposed mitigation. With respect to the site layout outlined in the Scoping Report, the positions of Turbines 9, 14, 28 and 29 are likely to need relocating to ensure suitable buffers are in place.	The assessment of effects is presented in **Section 11.10** and **Section 11.13**. 50m watercourse buffers are discussed in **Section 11.8**. Turbine locations and numbers have been revised since scoping, and all SEPA turbine location concerns have been addressed.
Detailed scoping requirements - abstraction mitigation	SEPA	If water abstractions or dewatering are proposed, a table of volumes and timings of abstractions and related mitigation measures must be provided.	The Applicant proposes that this requirement is conditioned as part of a consent plan.
Detailed scoping requirements - Best Practice mitigation guidance	SEPA	Further advice and best practice guidance are available within the water engineering section of the SEPA website (https://www.sepa.org.uk/regulations/water/engineering/). Guidance on the design of water crossings can be found in the SEPA Construction of River Crossings Good Practice Guide (https://www.sepa.org.uk/media/151036/wat-sg-25.pdf).	Key guidance such as the SEPA Construction of River Crossings Good Practice Guide is referenced in **Section 11.3**.
Detailed scoping requirements - flood risk guidance	SEPA	Refer to Appendix 2 of SEPA's Standing Advice for advice on flood risk (https://www.sepa.org.uk/media/136130/sepa-standing-advice-for-planning-authorities-and-developers-on-development-management-consultations.pdf). Watercourse crossings must be designed to accommodate the 0.5% Annual Exceedance Probability (AEP) flows, or information provided to justify smaller structures. If it is thought that the development could result in an increased risk of flooding to a nearby receptor then a FRA must be submitted.	Key guidance such as SEPA flood risk guidance is referenced in **Section 11.3**. Subsequent discussions between SEPA and Wood confirmed that SEPA is content with a high-level assessment at this EIA Report stage, looking at design flows and undertaking downstream impact assessment and mitigation,

Issue raised	Consultee(s)	Consultee comment	Applicant response for water elements
		Reference should be made to relevant SEPA guidance, including https://www.sepa.org.uk/media/162602/ss-nfr-p-002-technical-flood-risk-guidance-for-stakeholders.pdf and https://www.sepa.org.uk/media/94134/car-flood-risk-standing-advice-for-engineering-discharge-and-impoundment-activities.pdf. SEPA welcomes the commitment to the oversizing of the crossings but maintains that a FRA is required for the larger crossings such as of the Abhainn Ghrioda and Abhainn a' Ghlinn Mhòir, accompanied by supporting drawings of the proposed structures and approaching tracks, so that the full scale of the engineering works is understood.	including advising suitable crossing types. SEPA assumes a commitment to accommodate 1 in 200 flood event, and the Applicant agrees and proposes that this requirement is conditioned. Design flows are presented in **Section 11.5**, assessment of effects is in **Section 11.10** and **Section 11.13**, and watercourse crossing types proposed in **Section 11.12**.
Detailed scoping requirements - peat disturbance	SEPA	The layout must be designed to minimise disturbance of peat and consequential release of carbon dioxide and outline mitigation measures to avoid significant drying or oxidation of peat due to construction. There should be a detailed map of peat depths with all the built elements (including peat storage areas) overlain, and a table which details the quantities of acrotelmic, carotelmic and amorphous peat which would be excavated, and how it would be kept wet and where it would be reused during reinstatement. Advice is provided in https://www.scottishrenewables.com/publications/guidance-assessment-peat-volumes-reuse-excavated/ and https://www.sepa.org.uk/media/287064/wst-g-052-developments-on-peat-and-off-site-uses-of-waste-peat.pdf. The issue of a full Peat Management Plan (PMP) should be considered. More peat probing information than that presented in the Scoping Report will be required, and because of very deep peat Turbine 33 may need to be relocated.	More peat depth data have been acquired, see **Section 11.5** and **Appendix 9H** and the layout has been amended to further minimise effects on areas of deeper peat. Peat depths and the table detailing quantities of peat is also set out in **Appendix 9H**. Key guidance, including the SR and SEPA guidance, is referenced in **Section 11.3**. Turbine locations and numbers have been revised since scoping, and the Turbine 33 location no longer used.
Detailed scoping requirements - GWDTE map	SEPA	A map must be provided demonstrating that all GWDTEs and existing groundwater abstractions are outwith a 100m radius of all excavations less than 1m and outwith 250m of all excavations deeper than 1m and proposed groundwater abstractions (https://www.sepa.org.uk/media/144266/lups-gu31-guidance-on-assessing-the-impacts-of-development-proposals-on-groundwater-abstractions-and-groundwater-dependent-terrestrial-ecosystems.pdf). If these minimum buffers cannot be achieved, a detailed site specific qualitative and/or quantitative risk assessment will be required. SEPA welcomes the intent to append a separate GWDTE assessment.	Updated 'within LUPS-GU31 buffer' GWDTE descriptions are presented in **Section 11.5**, with the new GWDTE risk assessment presented in **Appendix 11F: GWDTE Risk Assessment**.
Detailed scoping requirements - forestry clearance	SEPA	'Key holing' should be used to minimise large scale forestry clearance and refer to and comply with the current Forest Plan is one exists. Clear felling may be acceptable only in cases where planting took place on deep peat and it is proposed through a HMP to reinstate peat-forming habitats. Appropriate forestry maps must be provided (https://www.sepa.org.uk/media/143799/use_of_trees_cleared_to_facilitate_development_on_afforested_land_sepa_snh_fcs_guidance-_april_2014.pdf).	Tree planting has taken place on areas of deep peat, and the HMP (**Appendix 9I**) identifies appropriate mitigation.

Issue raised	Consultee(s)	Consultee comment	Applicant response for water elements
Detailed scoping requirements - Site Management Plan (SMP)	SEPA	In accordance with https://www.gov.scot/Publications/1996/10/17729/23424, a SMP should be provided, together with maps of borrow pit location and dimensions, infrastructure, and a site-specific buffer around all water bodies (proportionate to the depth of the excavations and at least 10m from access tracks). All breaches of the buffer should be identified on a plan with an accompanying photograph, key dimensions and a drawing of the engineering works and a detailed layout of all proposed mitigation. Information should also be provided regarding water table elevation, water management, water abstractions, pollution prevention, soil and overburden storage and restoration.	Indicative borrow pit plans are set out in **Figures 4.12A-E**. The Applicant proposes that detailed borrow pit plans would be required by condition.
Detailed scoping requirements - pollution prevention schedule	SEPA	A schedule of pollution prevention supported by site specific maps and plans must be submitted. These must include reference to best practice pollution prevention and construction techniques and regulatory requirements (http://www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-ppgs-and-replacement-series/guidance-for-pollution-prevention-gpps-full-list/), and should set out the daily responsibilities of Ecological Clerk of Works (ECoWs), how site inspections would be recorded and acted upon and proposals for a planning monitoring enforcement officer.	Schedules of mitigation are presented in **Section 11.8** (embedded) and **Section 11.12** (additional). The Applicant proposes that further plans such as a Construction Environment Management Plan (CEMP) and other detailed arrangements are conditioned.
Detailed scoping requirements - decommissioning guidance	SEPA	Proposals for life extension, repowering and/or decommissioning must demonstrate accordance with SEPA guidance https://www.sepa.org.uk/media/219689/sepa-guidance-regarding-life-extension-and-decommissioning-of-onshore-windfarms.pdf. There must be no discarding of materials that are likely to be classified as waste.	Key guidance, including the SEPA decommissioning guidance, is referenced in **Section 11.3**. Should consent be granted, a condition requiring a decommissioning programme to be submitted prior to decommissioning is likely to be imposed.
Detailed scoping requirements - Bennadrove Landfill	SEPA	Turbines 12 and 33 are in close proximity to Bennadrove Landfill site, and an assessment should be undertaken of the potential impacts of the Proposed Development on the landfill and in particular on groundwater flows and pollutant pathways in this area, if necessary outlining proposed mitigation and monitoring.	Turbine locations and numbers have been revised since scoping, and the new Turbines 21 and 30 are both further away from the landfill. The assessment of potential effects including on Bennadrove Landfill presented in **Section 11.10**.
Detailed scoping requirements - CAR construction licence	SEPA	A CAR construction licence would be required for management of surface water runoff from the construction site.	Noted and accepted.
Water/waste water services	Scottish Water	Scottish Water has no objection to the planning application, but this does not confirm that the Proposed Development can be serviced with respect to potable water or foul sewerage (by way of North Lochs and Stornoway Waste Treatment Works respectively).	Noted.

Issue raised	Consultee(s)	Consultee comment	Applicant response for water elements
Scottish Water assets	Scottish Water	The Proposed Development impacts on existing Scottish Water assets.	Noted, includes suspected pipelines.
Drinking water catchments and abstraction sources	Scottish Water	There are no Scottish Water drinking water catchments or water abstraction sources, which are designated as Drinking Water Protected Areas (DWPAs) under the WFD, in the area.	Noted.
Sewer system	Scottish Water	Scottish Water will not normally accept any surface water connections into the combined sewer system.	Noted.
Hydrological surveys	Marine Science Scotland (MSS)	MSS notes that the proposed development is drained by watercourses supporting salmon, trout and eel populations and consists of a large number of water bodies and extensive peat deposits. MSS therefore welcomes the intention of the developer to carry out hydrological surveys and recommends a suite of hydrochemical parameters to be measured over a range of flows e.g. pH, alkalinity, acid neutralising capacity (ANC), dissolved organic carbon (DOC), nitrates, phosphates, aluminium (particularly if the area is prone to acidification), turbidity and flow data.	A commitment to monitoring is made in **Section 11.12**, and the Applicant proposes that the location, scope, frequency and duration of this monitoring is conditioned.
Monitoring programme	MSS	Such data complements electrofishing survey data and will allow an assessment of water quality from which appropriate site-specific mitigation can be drawn up and to facilitate the monitoring of water quality throughout the development period. Control sites, where an impact is unlikely, should also be selected, thereby allowing potential impacts associated with the development to be differentiated from non-developmental impacts e.g. climatic. The monitoring programme should be carried out at least 12 months prior to construction commencing, during construction and for at least 12 months after construction is complete. The latter time period is dependent on the results collected during the construction phase. Further sampling may be required one to two years prior to decommissioning taking place.	A commitment to monitoring is made in **Section 11.12**, and the Applicant proposes that this is conditioned.
Cumulative impact assessment	MSS	The potential cumulative impact on water quality as a result of the present proposal and adjacent developments e.g. wind farms, fish hatchery/harvesting station (operational and proposed) should be considered, particularly in the selection of control sites.	A consideration of the need for cumulative impact assessment is presented in **Section 11.11**. There are no consented or proposed developments that could result in cumulative effects when considered in combination with the Proposed Development proposal.
Watercourse crossings	MSS	MSS encourages the developer to ensure that the movement of fish is included in the design of all watercourse crossings and that The Forests and Water UK Forestry Standard Guidelines is consulted should felling be carried out.	Key guidance is referenced in **Section 11.3**, including the Forestry Standard. Watercourse crossing types are proposed in **Section 11.12**.

Issue raised	Consultee(s)	Consultee comment	Applicant response for water elements
Mitigation strategies	CnES	The proposed development has potential for negative effects on surface water and groundwater which may lead to flooding and pollution. CnES would expect the EIA to address these concerns and prepare mitigation strategies to reduce risk.	The assessment of effects including flood are presented in **Section 11.10** and **Section 11.13**. Schedules of mitigation are presented in **Section 11.8** (embedded) and **Section 11.12** (additional).
Watercourse buffers	CnES	Consideration should be given to locating turbine bases and power cabling away from watercourses. Current best practice in wind farm development includes the use of 50m buffer strips to the water environment, and the EIA should demonstrate if this has been achieved and, if not, identify the locations where it is breached.	The schedule of embedded mitigation is presented in **Section 11.8** and includes adherence to 50 m watercourse buffers throughout.
FRA	CnES	The EIA should clarify that the proposed land-based activities are located above an acceptable risk of flooding. If the FRA is separate to the EIA, the EIA should contain sufficient synopsis of the FRA and detail how the development has been designed to mitigate any identified flood risk constraint through sustainable flood management measures.	Design flows are presented in **Section 11.5**, and an assessment of flood effects is provided in **Section 11.10** and **Section 11.13**. Schedules of mitigation are presented in **Section 11.8** (embedded) and **Section 11.12** (additional, including watercourse crossing types).
Localised flooding	CnES	The northern access is located in an area of localised flooding and waterlogging which is prone to flooding and in periods of heavy rainfall floods, the main A859 carriageway. CnES (Technical Services – Roads) should be consulted on the EIA information requirements in this respect.	The assessment of local watercourse and wider flood effects is presented in **Section 11.10** and **Section 11.13**. The existing flood risk to the Proposed Development would be covered in the proposed CEMP.
Flood policy	CnES	CnES advises that the developer takes account of new LDP Policy EI1 Flooding; E12 Water and Waste Water; EI3 Water Environment and EI5 Soils. It recommends that the developer consults with SEPA to inform the assessment on these topics for the EIA.	Key guidance is referenced in **Section 11.3**, including these LDP policies. The assessment of effects is presented in **Section 11.10** and **Section 11.13**.
Pollution mitigation	CnES	CnES recommends that the developer consult with SEPA in regard to the emission of pollutants. All mitigation should be detailed within a suitably robust schedule of mitigation. The schedule of mitigation should be supported by these site-specific maps and plans. These must include reference to best practice pollution prevention and construction techniques (for example, limiting the maximum area to be stripped of soils at any one time) and regulatory requirements. They should set out the daily responsibilities of the ECoW, how site inspections will be recorded and acted upon and proposals for a planning monitoring enforcement officer. Reference should be made to SEPA's Guidance for Pollution Prevention (GPP) notes.	Schedules of mitigation are presented in **Section 11.8** (embedded) and **Section 11.12** (additional). The Applicant proposes that further detail such as the CEMP and associated plans should be conditioned.

Issue raised	Consultee(s)	Consultee comment	Applicant response for water elements
Peat survey and mitigation	CnES	Developers are required to undertake peat (depth) surveys, and subsequent mitigation and micro-siting. They should investigate the scope to utilise piled foundations on areas of deep peat or carbon rich soil in order to minimise disturbance and the generation of waste material. The mitigating work may be the subject of a planning condition or agreement.	Noted and agreed. More peat depth data have been acquired, see **Section 11.5** and **Appendix 9H**. Schedules of mitigation are presented in **Section 11.8**, including micro-siting.
Peat handling and restoration	CnES	CnES agrees with the Scoping Report's suggested approach with respect to peat handling and restoration and peat slide risk.	Noted. A peat slide risk assessment is included in **Appendix 9H.**

11.7 Scope of the Assessment

Spatial Scope

11.7.1 The spatial scope of the assessment of geology, hydrology and hydrogeology covers the Study Area described in **Section 11.4**, on the basis that the majority of the effects on the water environment due to the Proposed Development are considered unlikely to extend beyond 0.5 km beyond the Development Site.

11.7.2 The only receptors identified outside this Study Area are downgradient abstractions, properties/infrastructure at risk of flooding and one designated conservation site, on the basis that any changes in the surface and groundwater environment as a result of the Proposed Development could theoretically affect their catchments, flood risk and water supply respectively[3].

Temporal Scope

11.7.3 The temporal scope of the assessment of geology, hydrology and hydrogeology is consistent with the period over which the Proposed Development would be carried out and therefore covers the construction, operational and decommissioning periods.

Potential Receptors

11.7.4 The identified potential receptors are located in **Figure 11.1** and **Table 11.16**, ordered in accordance with their first appearance in the **Section 11.5** baseline i.e. groundwater, surface water and then composite receptors. The features are referred to by a one or two-letter category character and a two-digit sequential number code (for example W001, W02 etc. for watercourses and associated lochs and lochans). As previously noted, this chapter examines potential changes of the Proposed Development on the water environment supporting GWDTEs and conservation sites, not the habitats themselves, which are considered in **Chapter 9**.

[3] A similar >0.5km distant abstraction and flood risk receptors' approach was employed in the ESs for the Consented Development (Entec, 2011; Amec Foster Wheeler, 2015).

Table 11.16 Potential Geology, Hydrology and Hydrogeology Receptors

Reference No.	Receptor	Location
Aquifers and WFD groundwater bodies		
AQ01	Bedrock aquifer and Lewis and Harris WFD groundwater body	Beneath site
Landfills		
L01	Bennadrove Landfill	NB 393 342
Springs		
S01	Spring alongside A859	NB 396 315
Watercourses and associated lochs and lochans and WFD surface water bodies		
W01	Abhainn Lacasdail (including Loch nan Caorann and Loch Garbhaig) watercourse and WFD surface water body	Within site
W02	Allt Hogaraid	Within site
W03	Allt Hulabie	Within site
W04	Abhainn a' Ghlinn Mhòir (including Loch Airigh na Lic)	Within site
W05	Allt Airigh na Beiste (including Loch na Beiste Bige)	Within site
W06	Unnamed tributary from Loch a' Leadharain (including Loch a' Leadharain)	Within site
W07	Abhainn Ghrioda (including Loch Bhatandiop, Loch an Ois, Loch a Chlachain) watercourse and WFD surface water body	Within site
W08	Feadan Loch Lochan (including Loch Speireag)	Within site
W09	Unnamed tributaries of Abhainn Ghrioda to the south of Feadan Loch Lochan (with many lochans) (including Loch Druim nan Sgorach, Loch Uisg" an t-Solius, Loch Airigh Riabhach, Loch nan Sgiath, Loch Faoileag, Loch a' Bhuna, Loch Breugach, Loch Breag Cnoc a"Choilich)	Within site
W10	Unnamed tributary of Abhainn Ghrioda from Loch Briodag (including Loch Briodag, Loch Cnoc a" Choilich)	Within site
Humans, properties and infrastructure within areas prone to flooding		
F01	Properties and infrastructure on the Abhainn Lacasdail downstream of site	~NB 4105 3559
F02	Properties and infrastructure on the Abhainn a' Ghlinn Mhòir downstream of site	~NB 4050 3429
Abstractions		
A01	Marybank Quarry (borehole abstraction)	NB 40620 33010
A02	Creed Hatchery (abstraction from Abhainn Ghrioda)	NB 40212 32495
A03	Druim Dubh PWS (surface water abstraction)	NB 390 307
A04	Lews Castle PWS (groundwater abstraction)	NB 414 322
Conditions supporting GWDTEs and designated conservation sites		

Reference No.	Receptor	Location
CS01	Small area of M25a associated with the Abhainn Ghrioda	NB 355 322
CS02	M15b south and adjacent to A858	NB 387 341
CS03	M15b south and adjacent to A858, on north slopes of Cnoc Loch an Leadharain	NB 390 338
CS04	M25a south west of Loch a' Leadharain	NB 384 332
CS05	M15b extending down from catchment divide to Loch a' Leadharain	NB 384 335
CS06	M15c adjacent to tributary of Abhainn Ghrioda	NB 393 332
CS07	Strip of M6ci on the north east banks of Loch a' Leadharain	NB 387 334
CS08	Patch of M15c on slopes of Cnoc Loch a' Leadharain	NB 391 335
CS09	Patch of M15c on catchment divide at Cnoc Loch a' Leadharain	NB 391 336
CS10	Linear strip of M15b along southern edge of Bennadrove Landfill	NB 387 341
CS11	Small area of M6ci on the banks of the Allt Hulabie, at its southern extent	NB 376 340
CS12	A linear area of M6ci lying along the banks of the Abhainn Lacasdail along the extreme northern boundary of the Proposed Development	NB 382 359
CS13	A narrow area of M15b fringing the south western edge of Loch Garbhaig	NB 371 351
CS14	Patch of M15b on the south facing slope of Beinn Hulabaidh	NB 365 342
CS15	Lewis Peatlands Ramsar and SPA	Off site (e.g. NB 360 335)
CS16	Tong Saltings SSSI	Off site (e.g. NB 430 345)

Likely Significant Effects

11.7.5 The following geology, hydrology and hydrogeology receptors have been taken forward for assessment:

- Changes in groundwater level and quality within the underlying bedrock aquifer and WFD groundwater body, leading to a loss of water resource. This could occur as a result of:
  - Soil compaction and the introduction of areas of hardstanding during construction and operation reducing recharge and groundwater levels;
  - Dewatering during construction associated with the excavation of the turbine foundations and borrow pits leading to a decline in groundwater levels and possibly also induced leakage of contaminants from Bennadrove Landfill; and
  - Site activities during construction, operation and decommissioning resulting in the release of pollutants and the subsequent contamination of groundwater.
- Changes in groundwater level, leading to differential settlement and heave and damage to the Bennadrove Landfill's basal liner and disruption of the landfill's operation. This could occur:
  - During construction and operation as a result of areas of hardstanding reducing recharge and groundwater levels; and

- During construction as a result of dewatering associated with the excavation of the turbine foundations and borrow pits leading to a decline in groundwater levels.

- Changes in groundwater level and quality, leading to derogation (i.e. reduction in flow) and/or pollution of the spring observed alongside the A859 carriageway. This could occur:
  - During construction and throughout operation as a result of soil compaction and the introduction of areas of hardstanding reducing recharge and groundwater levels;
  - During construction related dewatering associated with the excavation of the turbine foundations and borrow pits leading to a decline in groundwater levels; and
  - During site activities in all phases resulting in the release of pollutants and the subsequent contamination of groundwater.
- Changes in flow and morphology and also sediment loading and pollution of watercourses, lochs and lochans and WFD surface water bodies. This could occur:
  - During construction as a result of soil compaction and the introduction of areas of hardstanding and throughout operation as a result of increasing runoff and sediment loading;
  - Disruption of flow paths and changes to drainage regime during construction and operation associated with increases in runoff and less on-site water retention;
  - Disruption of ground during construction leading to increased sediment loading;
  - Dewatering and/or drainage during construction disrupting groundwater support (baseflow) to watercourses;
  - Discharge to surface water of groundwater intercepted during the excavation of the turbine foundations and borrow pits and increasing flows and sediment loading; and
  - During site activities in all phases resulting in the release of pollutants and the subsequent contamination of surface waters.
- Increase in peak surface water flows, leading to heightened flood risks to downstream people, property and infrastructure. This could occur:
  - During construction as a result of soil compaction, the introduction of areas of hardstanding and changes of land use (e.g. vegetation clearance) and throughout operation by increasing runoff;
  - Disruption of flow paths and changes to drainage regime during construction and throughout operation can be associated with increases in runoff and less on-site water retention; and
  - Discharge to surface water of groundwater intercepted during construction associated with the excavation of the turbine foundations and borrow pits and increasing flows.
- Changes in water levels, flows and quality, leading to derogation and/or pollution of groundwater and surface water abstractions.
  - For groundwater this could occur:
    - As a result of soil compaction and the introduction of areas of hardstanding during construction and operation reducing recharge and groundwater levels;

    - Dewatering during construction associated with the excavation of the turbine foundations and borrow pits leading to a decline in groundwater levels and possibly also induced leakage of contaminants from Bennadrove Landfill;
    - Site activities during all phases resulting in the release of pollutants and the subsequent contamination of groundwater.
  - For surface water this could occur:
    - As a result of soil compaction and the introduction of areas of hardstanding during construction and operation increasing runoff and sediment loading;
    - Disruption of ground during construction leading to increased sediment loading;
    - Dewatering and/or drainage during construction disrupting groundwater support (baseflow) to watercourses;
    - Discharge to surface water of groundwater intercepted during the excavation of the turbine foundations and borrow pits and increasing flows and sediment loading; and
    - Site activities during all phases resulting in the release of pollutants and the subsequent contamination of surface waters.
- Changes in water levels, flows and quality and physical disturbance of the peat, leading to derogation and/or pollution of groundwater and surface water and disruption and breakdown of peat structure supporting GWDTEs and designated conservation sites.
  - With respect to groundwater support, this could occur:
    - As a result of soil compaction and the introduction of areas of hardstanding during construction and operation reducing recharge and groundwater levels;
    - Dewatering during the excavation of the turbine foundations and borrow pits leading to a decline in groundwater levels and possibly also induced leakage of contaminants from Bennadrove Landfill; and
    - Site activities during all phases resulting in the release of pollutants and the subsequent contamination of groundwater.
  - In addition, physical disturbance of the peat and groundwater throughflow could occur as a result of excavation works and peat stockpiling/removal. For surface water support, this could occur:
    - As a result of soil compaction and the introduction of areas of hardstanding during construction and throughout operation increasing runoff and sediment loading;
    - Disruption of flow paths and changes to drainage regime during construction and throughout operation can be associated with increases in runoff and less on-site water retention;
    - Disruption of ground during construction leading to increased sediment loading;
    - Dewatering and/or drainage during construction disrupting groundwater support (baseflow) to watercourses;
    - Discharge to surface water of groundwater intercepted during the excavation of the turbine foundations and borrow pits and increasing flows and sediment loading; and

  - o Site activities during all phases resulting in the release of pollutants and the subsequent contamination of surface waters. The consequential effects of these changes on the habitat types present are not a matter for this chapter, as mentioned earlier, but are addressed in **Chapter 9**.

11.7.6 The following theoretical receptors have been scoped out from being subject to further assessment because the potential effects are not considered likely to be significant:

- The 2011 and 2015 ESs concluded no significant effect on geology. Given that solid geological conditions have not changed in the interim, and that the construction techniques utilised are the same as assessed in the previous assessments, it is considered that a new assessment on this receptor would not reach different conclusions. Therefore, it is proposed that solid geology is scoped out as a receptor;
- Groundwater within the peatlands is not identified as an aquifer by the BGS and so is not regarded as an aquifer receptor in this assessment. However, this groundwater is still taken into account in the assessment in terms of its role in supporting the mosaic of peatlands and GWDTEs;
- GWDTEs and designated peatlands (the Lewis Peatlands SAC) outwith the infrastructure buffers shown on **Figures 11.9a-e** are considered to be beyond the ZoI of the Proposed Development; and
- A number of previously (2011 and 2015) assessed receptors are beyond the surface water and groundwater catchments underlying the Development Site, and also the Study Area, including, south of the site, the Allt na Craoibhe watercourse and WFD water body and the Loch Orasaigh WFD water body and its associated public water abstraction.

11.8 Environmental Measures Embedded into the Development Proposals

Design Evolution

Introduction

11.8.1 A qualitative, preliminary screening assessment for the potential location of the Proposed Development infrastructure was undertaken as part of a desk-based study. The purpose of this study was to identify potential significant constraints which may be posed by the baseline conditions of the Study Area, so that the construction plan and layout of the Proposed Development (as described in **Chapter 4** and **Figure 4.1**) could be developed / refined to account for these, and so minimise the potential risks and impacts to certain receptors during construction and operation.

11.8.2 A review of the baseline information for the Study Area (**Section 11.5**) identified potential development constraints associated with the Proposed Development, and these were taken into account during the evolution of the design of the Proposed Development. Areas that should not be considered for siting of turbines and access tracks or should be considered only if appropriate mitigation could be provided were identified.

11.8.3 The preliminary constraints map generated as part of the screening process identified areas of the Study Area with the key constraints, which were used to scope out potential locations for the wind turbines and site infrastructure. To establish an indicative wind farm layout, buffer zones were placed around specific areas of the Development Site where significant constraints were identified to exclude these from consideration as potential development areas (see **Figure 3.1**). A map of hydrological constraints, showing the Proposed Development layout, is shown in **Figure 11.10**.

11.8.4 Embedded mitigation proposals are those mitigation measures that are inherent to the Proposed Development. Embedded mitigation includes all mitigation usually assumed to be in place during construction, operation and decommissioning, and is generally regarded as industry standard or Best Practice. Construction and environmental management plans are introduced in **Section 4.4**, whilst an overview of some of the general (not project specific) environmental management considerations is included in **Section 4.7**. Water-specific embedded mitigation measures are presented below.

Avoidance of Flood Zones

11.8.5 The study identified potential significant fluvial flood constraints within certain areas of the Development Site. As a precaution, all areas identified as being located within a 1 in 100 year fluvial flooding zone were considered to be unsuitable for development. SPP (2014) states that developments should not be permitted in the 1 in 200 year flood zone unless it can be demonstrated that it would not affect the ability of the floodplain to store and convey water. As discussed earlier, the 1 in 200 year flood zones throughout the Development Site are virtually identical to the 1 in 100 year flood zones.

Watercourse Buffer Zones

11.8.6 Additionally, a 50m buffer zone was applied to the entire watercourse network, including springs. In addition to addressing flood risk, this considers the risk of pollution to watercourses and the surface water abstraction at Creed Hatchery on the Abhainn Ghrioda from construction activities and provides a buffer to reduce the risk of uncontrolled run-off to watercourses. The buffer zones are unsuitable for development, with the exception of watercourse crossings where appropriate mitigation is provided (see later). The buffer zones were defined based on the river network included on the OS mapping. Flow paths that were identified during the January 2019 and previous site visits (but not shown on the OS maps) have been considered on a case-by-case basis in terms of constraints to development, with a presumption that a buffer of at least 10 m should be applied.

Groundwater Abstraction Buffer Zones

11.8.7 No significant constraints regarding risks to groundwater resources were identified. No licensed groundwater abstractions for drinking water or industrial activities have been recorded within the Development Site. An off-site groundwater abstraction for PWS was identified at Lews Castle and a precautionary 250m buffer zone was placed around this feature, adopting the SEPA (LUPS-GU31) recommended 'separation distance' needed to provide protection from the effects of >1m deep excavations.

11.8.8 The groundwater abstraction identified by SEPA at Marybank Quarry, falling under CAR registration (i.e. less than 10m^3/day), has also been provided with a 250m buffer. Development within the buffer of the Marybank Quarry is not considered to be a complete constraint to development, on the basis that the water quality is of lesser importance compared to a potable supply, providing appropriate mitigation is provided.

Avoidance of Steep Gradients

11.8.9 Parts of the Study Area where steep slopes at or greater than 7° were mapped (**Figure 11.4**) and identified as a significant constraint due to potential peat slide risks and enhanced runoff. These areas, along with other areas identified as having potential historic peat slides, have been avoided for construction of turbines, as well as for other infrastructure and access tracks.

Avoidance of Deep Peat Deposits

11.8.10 Potential significant constraints were identified in areas of the Development Site where peat was shown to be deeper than 3m (see **Appendix 9H** and **Chapter 3**). This was done to minimise the volume of peat needing to be excavated. Every effort was made to avoid siting turbines in areas of relatively deep peat deposits, with only three of the 35 turbines (Turbines 5, 13, 26) being located in areas of peat depth greater than 3m (**Table 11.4**). Micro-siting during construction for those three turbines would aim to focus on areas of shallower peat.

Conservation Site Buffer Zones

11.8.11 Incursions into SEPA (LUPS-GU31) 100m (shallow excavation, <1m deep) and 250m (deep excavation, >1m deep) buffer areas around the high and moderate GWDTEs identified earlier (**Table 11.14** and **Appendix 11F: GWDTE Risk Assessment**) have been minimised as far as possible.

Micro-siting

11.8.12 High level desk-based micro-siting of proposed turbine locations has been carried out to ensure that ecological, hydrological and geotechnical aspects were optimised. In some cases, this resulted in further refinements of the turbine locations and the adjustments made to turbine locations for hydrological reasons are summarised in **Table 11.17**. The turbine locations that have been shown in the figures associated with this Chapter (e.g. **Figure 11.1**) take into account this micro-siting.

Table 11.17 Hydrological and Geological Considerations during Micro-siting

Turbine number	Reasoning
T10, T26 (from Layout 4)	Relocation of turbine away from areas of deepest peat
T7 (from Layout 4)	Relocation of turbine away from areas of deep peat, and to minimise effects on heritage asset
T30 (from layout 5)	Relocated to shallow peat
T17, T24, T32 and T34 (from layout 6)	Relocated to shallower peat post phase 2 peat surveys

11.8.13 Further micro-siting would be completed prior to construction following the outcome of detailed ground investigations. As stated in **Section 4.5**, it is proposed that appropriate levels of deviation would be up to 50m for turbines and 100m for internal wind farm tracks and other infrastructure such as substations and compounds.

CEMP

11.8.14 In accordance with the Good Practice guidance during Wind Farm Construction (SR, SNH, SEPA, FCS and HES, 2015), engineering activities that would involve the construction of river crossings or drainage systems are avoided where possible to ensure that the Development Site and surface water system remain in a near as natural a state as possible. However, there are circumstances where this is not achievable due to the nature of the Proposed Development and restrictions on access options.

11.8.15 Prior to the commencement of construction activities, a CEMP would therefore be produced that would follow Best Practice guidance, as well as incorporating specific recommendations made in this EIA Report, and would therefore account for potential risks and minimise potential effects on the site hydrology and hydrogeology during construction.

11.8.16 The CEMP would include or be accompanied by a Water Management Plan (WMP), a Pollution Prevention Plan (PPP) and a Pollution Incident Response Plan (PIRP) for construction activities at the site. The WMP would set out the specific details of surface water drainage, management of dewatered groundwater from excavations and watercourse crossings. The PPP would set out specific measures to protect water environment receptors from pollution arising from construction activities and a programme for inspection and monitoring to ensure the effectiveness of these measures. The PIRP would describe the response plan for pollution incidents, should accidental spillages occur despite the control measures in place.

Track Design

11.8.17 On areas of peat depths greater than 1m (i.e. covering the majority of the Development Site), floating roads are proposed. In a floating road, the weight of the road is supported by the peat beneath, thereby avoiding the need to construct foundations extending through to the underlying solid stratum. The floating roads would be constructed in line with the good practice guidance, and would include the use of geogrids and geotextiles. The geotextile used would be selected to maintain load distribution, ensure separation of aggregate and peat, and prevent peat rutting, erosion and drainage. Aggregate choice would be sensitive to peat geochemistry and would be of sufficient grade to allow infiltration through to the geotextile. A section drawing of two typical floating road/track construction methodologies (option A and option B) is given in **Figure 4.6** and for a standard excavated road in **Figure 4.7**.

11.8.18 Even with floating roads, some interruption of surface and near-surface flows can occur. The track layout has been designed to minimise the total track length, and to avoid, where possible, intersecting catchment areas in a manner that could significantly interrupt flow paths. Cross-drainage would be provided in areas where access tracks unavoidably intersect dominant flow pathways, as discussed below.

11.8.19 On areas of steeper gradient or where there are concerns about slope stability, the use of floating roads may not be appropriate and cut tracks would be considered. These would need to be cut all the way through the peat, thereby potentially increasing disturbance of the local hydrology. The extent of these access tracks would be minimised.

Drainage Design

11.8.20 The need for drainage on the access track network would be considered for all parts of the track network separately, since slope and wetness vary considerably across the Development Site. In flat areas, drainage of floating roads is not required as it can be assumed that rainfall on to the access track would infiltrate to the ground beneath the access track or along the verges. Track-side drainage would be avoided where possible, to prevent any local reductions in the water table or influences on the access track structure and compression (the latter can occur where a lower water table reduces the ability of the peat to bear weight, increasing compression).

11.8.21 Where access tracks are to be placed on slopes, lateral drainage would be required on the upslope side of the access track. The length of drains would be minimised, to prevent either pooling on the upslope side or, at the other extreme, creating long flow paths along which rapid run-off could occur. Regular cross-drains would be required to allow flow to pass across the access track (as recommended in SEPA's guidance on Good Practice During Windfarm Construction), with a preference for subsequent re-infiltration on the downslope side, rather than direct discharge to the drainage network.

11.8.22 Check dams may be implemented in drainage ditches where necessary to reduce flow velocities to aid in the sedimentation of silt from suspension and to also direct water into the cross drains so that natural flow paths are maintained as far as possible.

11.8.23 The ditch design would be considered in line with the recommendations of the FCS and SNH (2010) guidance, including the use of flat-bottomed ditches to reduce the depth of disturbance.

11.8.24 Cross-drainage may be by culverts or pipes beneath the access track, again in line with the FCS and SNH (2010) guidance. Drainage would be installed before or during access track construction, rather than afterwards, to ensure that the access track design is not compromised. The cross drainage would flow out into shallow drainage, which would allow diffuse re-infiltration to the peat on the downslope side. The cross drains would flow out at ground level and not be hanging culverts. The avoidance of steep gradients for the access tracks would also reduce the risk of erosion occurring at cross-drain outflows.

11.8.25 In instances of drainage close to surface watercourses, discharge from the drainage may be to surface water rather than re-infiltration. In these situations, good practice control measures including sediment settlement would be undertaken before the water is discharged into surface water systems. The discharges would be small and collected from only a limited area, rather than draining a large area to the same location. Sufficient attenuation storage would also be incorporated into site drainage systems to ensure that discharge rates to watercourses do not adversely affect the hydrology of the site.

11.8.26 Although drainage would be provided in areas of disturbance as required, areas of hardstanding would be minimised so that this need is reduced. This includes careful design of construction compounds and minimising the size of crane pads at each turbine location.

11.8.27 The details of proposed site drainage measures would be set out in the WMP for the Development Site, which would accompany the CEMP. As the area of the Development Site considerably exceeds 4 ha, discharges from construction phase site surface water drainage systems would be subject to a CAR Complex Licence from SEPA. The WMP would be subject to approval by SEPA through the CAR licence application process.

Cable Trench Design

11.8.28 Cables would be run alongside access tracks wherever possible. There is one instance where this is not possible: in order to connect the southern and northern parts of the Proposed Development it would be necessary to attach the cable to the side of a bridge over a watercourse, as discussed later (**Section 11.8.39**).

11.8.29 Cable trenches alongside access tracks would be installed at the minimal depth practical, although this may reach 0.5 – 1m deep. The trenches would be dug and left open for the minimum time possible to ensure that they do not create open drainage routes. The trench would be backfilled as far as possible with excavated peat, to minimise the change to flow paths. Where other material is used to backfill the trenches, clay cut-off barriers would be installed across the trench to prevent them creating preferential flow paths.

11.8.30 Cable laying methods that do not require a dug trench would be considered. FCS/SNH (2010) suggest that it may be possible to inset the cable in peat flanks alongside the edges of the floating roads, so that they are protected but do not need to be dug into the ground, disturbing the peat and associated flow paths (as discussed also in **Appendix 9H**).

Watercourse Crossings Design

11.8.31 The number of watercourse crossings has been minimised as far as possible, but due to the number of watercourses and preferential flow pathways on the Development Site and limitations regarding access locations, it is not possible for the Proposed Development to take place without some watercourse crossings. The types of water crossing available typically comprise bridges, culverts and causeways. Bridges in general are the preferred solution due to their lesser hydrological and ecological effects, but where there are small or indistinct channels with little topographic variability culverts are more appropriate.

11.8.32 Adherence to the SEPA Good Practice Guide for the Construction of River Crossings and WAT-SG-21 and CIRIA Culvert Design and Operation Guide (C689) would help minimise potential hydrological (including morphological) effects. All watercourse crossings would be designed to convey a 1 in 200 year return period flood event, as identified in **Table 11.6**, and each watercourse/ flow pathway crossing has been considered individually with respect to topography and hydrology. The proposed locations and types of watercourse and flow path crossings are shown in **Figure 11.5** and **Appendix 11C: Watercourse crossing photographs**. Further information is provided in **Table 11.18**.

Table 11.18 Types of Watercourse and Flow Path Crossings

Crossing number	Location	Receptor code	Grid reference	Type	Comments
RX7	Crossing Abhainn a' Ghlinn Mhòir upstream of Loch Airigh na Lic	W04	38848 33957	Bridge	Single-span bridge.
RX9	On existing track from Bennadrove to Pentland Road junction	W03 (W04)	37711 34178	Bottomless culvert	Existing culvert under existing track: upgrade only. Upgraded culvert to be bottomless.
RX21	Unnamed tributary of the Abhainn Ghrioda	W07 (WB02)	37590 32824	Bottomless culvert	Detailed design has indicated that a bottomless culvert is more suitable than a bridge.
RX26	Crossing main Abhainn Ghrioda, upstream of Feadan Loch Lochan confluence	W07 (WB02)	37702 31998	Bridge	Single-span bridge design.
RX27	Crossing unnamed channel upstream of Loch Speireag in south west of the site	W08 (W07, WB02)	35084 31673	Bottomless culvert	The topography of this crossing makes a bottomless culvert more suitable than a bridge crossing.
RX28	Crossing Feadan Loch Lochan between Loch Speireag and Abhainn Ghrioda	W08 (W07, WB02)	37809 31718	Bottomless culvert	Bottomless culvert that will not interfere with the channel bed.
RX29	Unnamed tributary: downstream of Loch Uisg an t-Soluis	W09 (W07, WB02)	37894 31610	Bridge	Single-span bridge.
RX31	Western slope of Cnoc Loch a' Leadharain	W04	38950 33660	Bottomless culvert	Very small catchment area.
RX32	Southern slope of Cnoc Loch a' Leadharain	W06 (W07, WB02)	39081 33483	Bottomless culvert	Very small catchment area. The flow is very diffuse and a causeway design could instead be utilised to allow diffuse flow over wider area.
RX33	Along northern access track from A859	W06 (W07, WB02)	40143 33213	Bottomless culvert	A causeway design may be appropriate as the location may be a (Scottish Water) pipeline and not an open, natural watercourse.
RX34	Outflow from Loch a' Leadharain (to south east of loch)	W06 (W07, WB02)	39149 33245	Bottomless culvert	Poorly defined channel, but taking outflow from loch. Causeway design may be utilised to allow diffuse flow over wider area.
RX35	South of Loch a' Leadharain	W06 (W07, WB02)	38743 33175	Bottomless culvert	Small catchment area.

Crossing number	Location	Receptor code	Grid reference	Type	Comments
RX36	Between Loch Breag Cnoc a'Cholich and Loch Briodag. Outflow from Loch Breag Cnoc a'Cholich	W09 (W07, WB02)	38363 31417	Bottomless culvert	Poorly defined channel, but taking outflow from loch. Causeway design may be utilised to allow diffuse flow over wider area.
RX37	On southern access track from A859. Outflow from Loch Briodag	W010 (W07, WB02)	39300 31317	Bottomless culvert	Poorly defined channel, but taking outflow from loch. Causeway design may be utilised to allow diffuse flow over wider area.
RX40	Flat boggy area above and Allt Hulabie.	W03 (W04)	38119 34817	Bottomless culvert	Small catchment area.
RX41	Unnamed tributary: downstream of Loch Uisg an t-Soluis	W09 (W07, WB02)	37558 31324	Bridge	Single-span bridge.

11.8.33 Four single-span bridges are proposed wherever the channel structure is appropriate to ensure that there are no effects on conveyance or morphology. The bridge structure would not affect either the channel or banks and can be built over the existing alignment of larger watercourses without the need for diversion. A typical bridge section is shown in **Figure 4.8**.

11.8.34 New culverts have been proposed for twelve locations where the small size and channel capacity limit the hydrological and ecological benefits that a bridge would bring, or where the lack of topographic variation would make bridge design unfeasible. The size of the culvert would be determined by the design flow of the watercourse and its gradient at the point of crossing, and a typical section is shown in **Figure 4.9**. Further details regarding culvert design and construction are provided in **Section 4.5**.

11.8.35 At five proposed culvert locations there is little observable surface flow, although the topography, vegetation, and sometimes collapsed sections of peat, are indicative of a preferential flow path. In these locations, the flow is predominantly sub-surface, but may emerge at the surface in some locations and/or during periods of high flow. These locations may require further consideration in the design in terms of both conveyance capacity and geotechnical stability. A causeway approach may become the preferred solution at these crossings, whereby a coarse rock structure would be built up crossing the flow path. This would provide solid foundations for the track, while retaining a porous structure between the rocks for flow to pass through.

11.8.36 The level of CAR authorisation likely to be required for the watercourse crossings discussed above has been considered, and strict adherence to the conditions stipulated by SEPA would further reduce effect. Minor bridges fall under GBR6 and are defined in CAR (2011) as *"a bridge having no part of its structure within the channel of a river, burn or ditch and constructed for the purpose of supporting a footpath, cycle route or single track road"*. The roads on the Proposed Development are intended to be a minimum of 5m wide, with passing places every 300m or as required. On this basis, it may be possible for the four bridges to be defined as minor bridges, although depending on whether widening is required at the bridges, it is possible that a Registration may be required.

11.8.37 Culverts cannot be installed under GBRs. The twelve locations for which culverts are proposed would therefore require some level of authorisation under CAR. Registration is required for *"pipe or box culverts used for footpaths, cycle route or single track road in rivers < 2m wide"*. Registration is also required for bottomless arch culverts over wider watercourses where no part of the structure encroaches on the channel bed, and provided the total length of structures on both banks does not exceed more than 20m. Pipe or box culverts for watercourses exceeding 2m in width would require a Simple Licence.

11.8.38 The causeways that have been mentioned above do not require any level of authorisation, since they do not cross recognised watercourses with flowing surface water.

11.8.39 All turbine cables would lead to the substation that is proposed at NGR NB 392 335. This means that the cables from south of the Abhainn Ghrioda would need to be brought to the north. This would require attaching the cable to the side of the intended single span bridge at RX36 (**Table 11.18**).

Excavations and Associated Drainage

11.8.40 Where possible, excavations required to facilitate the construction of foundations for turbines, service trenches and each crane base would be designed so that they can freely drain by gravity (see **Section 4.5**). Cut-off drains would be installed around the excavation areas to prevent surface run-off entering the excavations.

11.8.41 Measures based on Best Practice guidelines from SEPA would be adopted during construction to prevent pollution, with all contractors advised of a pre-planned pollution incident response procedure, as detailed in PPG21. The turbine foundation design minimises excavation requirements in accordance with BS6031: 2009 Code of Practice for Earth Works.

11.8.42 Turbine construction would need to adopt mitigation measures to prevent contaminants entering the shallow groundwater system. The main potential groundwater effect arising from the construction of turbine foundations and adjacent crane pads is the risk of leaking concrete residues into the water environment. Given the dominant soil type and areas of peat distribution, the near-surface groundwater at the Development Site is likely to be acidic. Therefore, to minimise the potential of concrete leaching and alkaline pollution of groundwater, suitable sulphate-resistant concrete would be used. The foundation design would be checked with SEPA.

11.8.43 Should ground conditions occur during excavation where gravity drainage is not possible (i.e. where low permeability rock or superficial deposits are present) the excavations would be dammed and drained by pumping. These dewatering activities would be undertaken in accordance with good practice (including WAT-SG-29 on Temporary Construction Methods), which would be detailed in the CEMP to be agreed by SEPA and the ECoW.

11.8.44 The design for the dewatering would ensure collection and settling of suspended sediment (i.e. use of silt traps, fences, straw bales or lagoons). Any water removed from the excavation would be treated and pumped to a bunded and vegetated settlement and infiltration swale, downgradient of the excavation and away from watercourses, and there would be no discharge of water directly into a watercourse. The potential for infiltration would need to be carefully assessed during the detailed design should consent be granted for the Proposed Development due to the prevalence of saturated conditions across the Development Site. Should this be an issue, a number of these swales could be used with a wide spatial distribution to prevent oversaturation. If large volumes of water are expected from dewatering, other SuDS elements such as french drains could also be utilised (subject to ground conditions). Should local topography or ground conditions prove unsuitable for construction of either infiltration swales or settlement lagoons, the use of portable silt trap devices such as 'Siltbuster' type tanks could be considered for removal of elevated suspended solids from water pumped from excavations. These activities would be designed and implemented in consultation with SEPA on a foundation-specific basis following completion of detailed ground investigations and micro-siting prior to construction.

11.8.45 The locations of swales or settlement lagoons, where required, would be on stable areas of shallow slope, to reduce the risk of failure. The size of the settlement lagoons would be appropriate to the amount of dewatering, but if large quantities of dewatering are anticipated, the potential for more than one lagoon or the use of portable silt trap devices would be considered on a foundation-by-foundation basis. If any discharge to surface watercourses is required, the water would be treated beforehand and the need for any consent from SEPA obtained (it is expected that in most cases the activities would be covered by GBR3 and/or GBR15).

11.8.46 A total of up to five borrow pits have been proposed to provide a supply of crushed aggregate and rock during the construction phase. The excavation of these borrow pits would require dewatering during their operation to enable the rock to be removed, although based on the status of the aquifer (low permeability) it is anticipated that the volumes of water and impacts to groundwater resources would be limited. Similar controls to those detailed above would be employed to prevent contamination of surface waters with suspended sediment. Based on the nature of the underlying geology, it is assumed that groundwater flow in the solid geology is very limited and so, as no abstraction points have been identified in proximity to the proposed borrow pit locations, dewatering would not affect existing abstractions. However, the dewatering of excavations at greater than $10m^3$/day would require CAR Registration, while over $50m^3$/day would require a CAR licence. Abstractions smaller than $10m^3$/d would comply with GBR3.

Peat Excavations and Storage

11.8.47 Surface run-off from stockpiles of excavated peat, whether temporarily stored prior to backfilling or permanent stored in peat storage areas, has the potential to affect surface water quality due to the transportation of suspended solids in surface water run-off. Therefore, good practice measures would be implemented to ensure that peat is appropriately stored.

11.8.48 During the design phase of the Proposed Development, the selection of appropriate turbine sites has wherever possible avoided areas where substantial peat thicknesses have been identified (**Table 11.17** identifies some specific locations where turbine locations were moved during micro-siting to avoid deep peat). This helps to reduce the volumes of peat required to be excavated for the construction of concrete foundation slabs, and therefore the need to manage materials. However, it has not been possible to avoid all areas where peat overlies the solid geology. Consequently, mitigation measures would be adopted to prevent changes as a result of the Proposed Development which have the potential to influence water quality.

11.8.49 Surface run-off from stockpiled materials excavated has the potential to affect surface water quality if these are inappropriately excavated and stored. The peat storage areas would be located at a distance from any watercourses (outwith the 50m watercourse buffers) and would be contained to prevent sediment or nutrient run-off from eventually reaching downstream watercourses.

11.8.50 The storage of peat during construction would minimise slumping and maintain stratification, where possible using water derived from dewatering activities to keep the peat adequately saturated to prevent desiccation and degradation. It is anticipated that all excavated peat can be re-used on site (see **Appendix 9H**). It is not therefore expected that any peat would need disposal or long-term storage, by way of a waste management licence. Neither is it expected that there would need to be storage of 'waste peat' for a period greater than three years (or greater than one year where storage takes place prior to disposal) and thus no requirement for a permit in accordance with the Landfill (Scotland) Regulations 2003.

11.8.51 The upper levels of the peat and turf excavated for the turbine bases can be used for resurfacing following construction (in non-hardstanding areas), thus maintaining the hydrological and biological characteristics of the location. This resurfacing would aim to restore a flat surface around the turbine, preventing mounding. This would help to re-establish hydraulic continuity of the replaced peat and turf with surrounding saturation levels, thereby reducing the possibility of peat drainage and desiccation.

Site Working Practices

11.8.52 Site activities during construction and operation have been identified to have potential effects on the water environment. These can be controlled by the implementation of pollution prevention and control measures and good practice, based on the guidance outlined earlier.

11.8.53 The site induction for contractors would include a specific session on good practice to prevent and control water pollution from construction activities. Contractors would be advised of their statutory responsibility not to "cause or knowingly permit water pollution". A PPP and PIRP would be prepared for the Proposed Development, the latter in line with GPP 21, and all contractors would be briefed on these plans, with copies made available on site. Equipment to contain and absorb spills would also be readily available.

11.8.54 Fuel and oil may enter the groundwater by migration vertically into the underlying groundwater or by run-off into nearby surface waters, if accidentally released or spilled during storage and refuelling. To minimise potential releases into the water environment, fuel would be stored in either a bunded area or self-bunded above-ground storage tank (AST) on site during the course of the construction phase in accordance with the Water Environment (Oil Storage) (Scotland) Regulations 2006 and other SEPA Pollution prevention guidelines, and GBR9. The bunded area would have a capacity of 110% of the fuel tank. All stores would be located at least 20m from any watercourses.

11.8.55 In areas where there is a potential for hydrocarbon residues from run-off/ isolated leakages, such as in plant storage areas and around fuel storage tanks and in refuelling zones in the proposed temporary site compound, surface water drainage would be directed to a hydrocarbon interceptor prior to discharge. The interceptor would filter out hydrocarbon residues from drainage water and retain hydrocarbon product in the event of a spillage to prevent release into surface waters at the discharge point and deterioration of downstream water quality.

11.8.56 Plant and machinery used during the construction phase would be maintained to minimise the risks of oils leaks or similar. Maintenance and refuelling of machinery would be undertaken off-site or within designated areas of temporary hardstanding. In these designated areas, contingency plans would be implemented to ensure that the risk of spillages is minimised. Placing a drip tray beneath plant and machinery during refuelling and maintenance would contain small spillages.

11.8.57 To prevent ingress of salt onto the Development Site from the Marybank salt store at the site entrance, bunding would be installed and maintained downgradient of the salt store, with periodic removal of the retained waters.

11.8.58 The main potential hydrological effects during the operational phase of the Proposed Development relate to the servicing of the turbines and storage of oils and lubricants involved in the process which may be accidentally released into the water environment. This includes the turbine gearbox oil changes, which are proposed to be undertaken every 18 months during the lifetime of the Proposed Development.

11.8.59 The potential risks posed to surface water and groundwater quality, specifically related to operation, are likely to be limited and localised based on the planned works and the nature and volume of substances required. Any potential risk to the environment would be identified by the operator prior to servicing being undertaken. The operator would ensure a site-specific risk assessment is completed and that control measures are implemented to ensure all environmental risks are minimised. However, as a pre-requisite the storage, use and disposal of oils would be done in accordance with good practice and SEPA guidance (GPP 8) (see earlier).

11.8.60 Potential ongoing effects in relation to infrastructure remaining on the Development Site during operations (including the turbine locations and access tracks) were addressed during the discussion of construction mitigation above. Ongoing maintenance would be carried out, for example, to maintain drainage and settlement ponds.

Summary

11.8.61 A range of environmental measures have been embedded into the development proposals as outlined above. **Table 11.19** outlines how these embedded measures relate to each of the receptor groups in the geology, hydrology and hydrogeology assessment.

Table 11.19 Summary of the Embedded Environmental Measures

Receptor	Changes and effects	Embedded measures
Aquifers and WFD groundwater bodies	Soil compaction and the introduction of areas of hardstanding during construction and throughout operation reducing recharge and groundwater levels, leading to a loss of water resource	CEMP
	Dewatering during construction associated with the excavation of the turbine foundations and borrow pits leading to a decline in groundwater levels and possibly also induced leakage of contaminants from Bennadrove Landfill, leading to a loss of water resource	CEMP Dewatering of excavations and associated drainage consistent with requirements of GBRs 3 and 15.
	Site activities during construction, operation and decommissioning resulting in the release of pollutants and the subsequent contamination of groundwater, leading to a loss of water resource	CEMP Site working practices
Landfills	Areas of hardstanding during construction and throughout operation reducing recharge and groundwater levels, leading to differential settlement and heave and damage to the landfill's basal liner and disruption of the landfill's operation	CEMP
	Dewatering during construction associated with the excavation of the turbine foundations and borrow pits, leading to differential settlement and heave and damage to the landfill's basal liner and disruption of the landfill's operation	CEMP Dewatering of excavations and associated drainage consistent with requirements of GBRs 3 and 15.

Receptor	Changes and effects	Embedded measures
Springs	Soil compaction and the introduction of areas of hardstanding during construction and throughout operation reducing recharge and groundwater levels, leading to spring derogation	Watercourse buffer zones CEMP
	Dewatering during construction associated with the excavation of the turbine foundations and borrow pits leading to a decline in groundwater levels and spring derogation	Watercourse buffer zones CEMP
	Site activities during construction, operation and decommissioning resulting in the release of pollutants and the subsequent contamination of groundwater and spring pollution	Watercourse buffer zones CEMP Site working practices
Watercourses and associated lochs and lochans and WFD surface water bodies	Soil compaction and the introduction of areas of hardstanding during construction and throughout operation increasing runoff and sediment loading, leading in changes in watercourse flow, quality and morphology	Avoidance of flood zones Watercourse buffer zones Avoidance of steep gradients Micro-siting CEMP Track design Drainage design Cable trench design Watercourse crossings design
	Disruption of flow paths and changes to drainage regime during construction and throughout operation can be associated with increases in runoff and less on-site water retention, leading in changes in watercourse flow and morphology	Avoidance of flood zones Watercourse buffer zones Avoidance of steep gradients Micro-siting CEMP Track design Drainage design Cable trench design Watercourse crossings design Peat excavation and storage
	Disruption of ground during construction leading to increased sediment loading, leading in changes in watercourse quality and morphology	Avoidance of flood zones Watercourse buffer zones Avoidance of steep gradients Micro-siting CEMP Track design Drainage design Cable trench design Watercourse crossings design Peat excavation and storage
	Dewatering and/or drainage during construction disrupting groundwater support (baseflow), leading in changes in watercourse flow	Avoidance of flood zones Watercourse buffer zones Micro-siting CEMP Excavations and associated drainage

Receptor	Changes and effects	Embedded measures
	Discharge to surface water of groundwater intercepted during construction associated with the excavation of the turbine foundations and borrow pits, leading to changes in watercourse flow, quality and morphology	Avoidance of flood zones Watercourse buffer zones Avoidance of steep gradients Micro-siting of turbines and tracks CEMP Excavations and associated drainage
	Site activities during construction, operation and decommissioning resulting in the release of pollutants and the subsequent contamination of surface waters, leading to changes in watercourse quality and morphology	Avoidance of flood zones Watercourse buffer zones Avoidance of steep gradients Micro-siting CEMP Watercourse crossings design Site working practices
People, properties and infrastructure within areas prone to flooding	Soil compaction, the introduction of areas of hardstanding and changes of land use (e.g. vegetation clearance) during construction and throughout operation increasing runoff and flood risk	Avoidance of flood zones Watercourse buffer zones Avoidance of steep gradients Micro-siting CEMP Track design Drainage design Cable trench design Watercourse crossings design
	Disruption of flow paths and changes to drainage regime during construction and throughout operation can be associated with increases in runoff and less on-site water retention, and increased flood risk	Avoidance of flood zones Watercourse buffer zones Avoidance of steep gradients Micro-siting CEMP Track design Drainage design Cable trench design Watercourse crossings design
	Discharge to surface water of groundwater intercepted during construction associated with the excavation of the turbine foundations and borrow pits and increasing flows and flood risk	Avoidance of flood zones Watercourse buffer zones Avoidance of steep gradients Micro-siting CEMP Excavations and associated drainage
Abstractions (groundwater)	Soil compaction and the introduction of areas of hardstanding during construction and throughout operation reducing recharge and groundwater levels, leading to abstraction derogation	Groundwater abstraction buffer zones CEMP
	Dewatering during construction associated with the excavation of the turbine foundations and borrow pits leading to a decline in groundwater levels and possibly also induced leakage of contaminants from Bennadrove Landfill, resulting in abstraction derogation and pollution	Groundwater abstraction buffer zones CEMP

Receptor	Changes and effects	Embedded measures
	Site activities during construction, operation and decommissioning resulting in the release of pollutants and the subsequent contamination of groundwater, leading to abstraction pollution	Groundwater abstraction buffer zones CEMP Site working practices
Abstractions (surface water)	Soil compaction and the introduction of areas of hardstanding during construction and throughout operation increasing runoff and sediment loading, leading to abstraction pollution	Avoidance of flood zones Watercourse buffer zones Avoidance of steep gradients CEMP Watercourse crossings design
	Disruption of ground during construction leading to increased sediment loading and abstraction pollution	Avoidance of flood zones Watercourse buffer zones Avoidance of steep gradients CEMP Watercourse crossings design
	Dewatering and/or drainage during construction disrupting groundwater support (baseflow) to watercourses, leading to abstraction derogation	Avoidance of flood zones Watercourse buffer zones CEMP
	Discharge to surface water of groundwater intercepted during construction associated with the excavation of the turbine foundations and borrow pits and increasing flows and sediment loading, leading to abstraction pollution	Avoidance of flood zones Watercourse buffer zones Avoidance of steep gradients CEMP
	Site activities during construction, operation and decommissioning resulting in the release of pollutants and the subsequent contamination of surface waters, leading to abstraction pollution	Avoidance of flood zones Watercourse buffer zones Avoidance of steep gradients CEMP Watercourse crossings design Site working practices
Conditions supporting GWDTEs and designated conservation sites (groundwater)	Soil compaction and the introduction of areas of hardstanding during construction and throughout operation reducing recharge and groundwater levels, leading to reduced groundwater availability for peatlands	Avoidance of deeper peat deposits Conservation site buffer zones CEMP Micro-siting Track design
	Dewatering during construction associated with the excavation of the turbine foundations and borrow pits leading to a decline in groundwater levels and possibly also induced leakage of contaminants from Bennadrove Landfill, and reduced/polluted groundwater supporting peatlands	Avoidance of deeper peat deposits Conservation site buffer zones CEMP Excavations and associated drainage
	Site activities during construction, operation and decommissioning resulting in the release of pollutants and the subsequent contamination of groundwater, and polluted groundwater supporting peatlands	Avoidance of deeper peat deposits Conservation site buffer zones CEMP Site working practices

Receptor	Changes and effects	Embedded measures
	Physical disturbance of the peat and groundwater throughflow could occur as a result of excavation works and peat stockpiling/removal, and result in reduced groundwater supporting peatlands	Avoidance of deeper peat deposits Conservation site buffer zones CEMP Peat excavation and storage
Conditions supporting GWDTEs and designated conservation sites (surface water)	Soil compaction and the introduction of areas of hardstanding during construction and throughout operation increasing runoff and sediment loading, leading to reduced/polluted surface water supporting peatlands	Avoidance of steep gradients Avoidance of deeper peat deposits Conservation site buffer zones Micro-siting CEMP Track design Drainage design Cable trench design Watercourse crossings design
	Disruption of flow paths and changes to drainage regime during construction and throughout operation can be associated with increases in runoff and less on-site water retention, leading to reduced surface water availability for peatlands	Avoidance of steep gradients Avoidance of deeper peat deposits Conservation site buffer zones Micro-siting CEMP Track design Drainage design Cable trench design Watercourse crossings design Peat excavation and storage
	Disruption of ground during construction leading to increased sediment loading leading to polluted surface water supporting peatlands	Avoidance of steep gradients Avoidance of deep peat deposits Conservation site buffer zones Micro-siting CEMP Track design Drainage design Cable trench design Watercourse crossings design Peat excavation and storage
	Dewatering and/or drainage during construction disrupting groundwater support (baseflow) to watercourses leading to reduced surface water availability for peatlands	Avoidance of deep peat deposits Conservation site buffer zones Micro-siting CEMP Excavations and associated drainage
	Discharge to surface water of groundwater intercepted during construction associated with the excavation of the turbine foundations and borrow pits and increasing flows and sediment loading, leading to polluted surface water supporting peatlands	Avoidance of steep gradients Avoidance of deep peat deposits Conservation site buffer zones Micro-siting CEMP Excavations and associated drainage
	Site activities during construction, operation and decommissioning resulting in the release of pollutants and the subsequent contamination of surface waters and polluted surface water supporting peatlands	Avoidance of steep gradients Avoidance of deep peat deposits Conservation site buffer zones Micro-siting CEMP Watercourse crossings design Site working practices

11.9 Assessment Methodology

11.9.1 The generic project-wide approach to the assessment methodology is set out in **Chapter 2: Approach to Preparing the Environmental Impact Assessment Report**, and specifically in **Section 2.5 - 2.7**. However, whilst this has informed the approach that has been used in this chapter's assessment, it is necessary to set out how this methodology has been applied, and adapted as appropriate, to address the specific needs of the Geology, Hydrology and Hydrogeology assessment.

11.9.2 The significance of the effects resulting from the Proposed Development is primarily determined by the value of a given water feature and the magnitude of change. In terms of the hydrology and hydrogeology, the key types of effects relate to water quantity (level and flow), and quality. However, depending on the effects on surface water flows, there may also be effects on immediate and downstream morphology and sediment dynamics and flood risk[4].

11.9.3 The method and criteria used to determine value, magnitude of change, and the significance of the effects, is described in this section and the findings are presented in **Section 11.10**.

11.9.4 The value of hydrological and hydrogeological water features scoped into the assessment is normally related to the importance of the surface water or groundwater feature. **Table 11.20** provides a summary of the criteria used in the valuation of water features and introduces the concept of receptor type (groups of receptors whose value is assessed using the same criteria). The criteria are semi-quantitative and therefore professional judgement has been applied to the assessment.

Table 11.20 Summary of Value of Geology, Hydrology and Hydrogeology Receptors

Value	Criteria	Receptor type*	Examples
High	Features with a high yield, quality or rarity with little potential for substitution	Aquatic environment	Conditions supporting a site with an international conservation designation (SAC, SPA, Ramsar), where the designation is based specifically on aquatic features. WFD surface water body (or part thereof) with overall High status, also any associated upstream non-reportable WFD surface water body or non-WFD surface water body. WFD surface water body (or part thereof) with High status for morphology.
	Water use supporting human health and economic activity at a regional scale	Water use	CAR-licensed public surface water or groundwater supply (and associated catchment) or permitted discharge.
	Features with a high vulnerability to flooding	Flood risk	Land use type defined as 'Essential Infrastructure' (i.e. critical national infrastructure, such as essential transport and utility infrastructure) and 'Most Vulnerable Use' (e.g. police/ambulance stations that are required to operate during flooding, mobile homes intended for permanent residential use) in the SPP flood risk land use vulnerability classification.

[4] As noted in **Section 11.7**, effects on water-dependent habitats themselves, rather than simply the water conditions that support these sites, are addressed in **Chapter 9**.

Value	Criteria	Receptor type*	Examples
Medium	Features with a medium yield, quality or rarity, with a limited potential for substitution	Aquatic environment	Conditions supporting a site with a national conservation designation (e.g. SSSI, National Nature Reserve (NNR)), where the designation is based specifically on aquatic features. WFD surface water body (or part thereof) with overall Good status/potential, also any associated upstream non-reportable WFD surface water body or non-WFD surface water body. WFD groundwater body (or part thereof) with overall Good status.
	Water use supporting human health and economic activity at a local scale	Water use	Local public surface water and groundwater supply (and associated catchment) or permitted discharge. CAR-licensed non-public surface water and groundwater supply abstraction (and associated groundwater catchment) which is relatively large relative to available resource, or where raw water quality is a critical issue, e.g. industrial process water, or permitted discharge.
	Features with a medium vulnerability to flooding	Flood risk	Land use type defined as 'Highly Vulnerable Use' in the SPP flood risk land use vulnerability classification (e.g. most types of residential development, hostels and hotels, landfill and waste management facilities).
Low	Features with a low yield, quality or rarity, with some potential for substitution	Aquatic environment	Conditions supporting a site with a local conservation designation (e.g. Local Nature Reserve (LNR)), where the designation is based specifically on aquatic features, or an undesignated but highly/moderately water-dependent ecosystem, including a Listed Wildlife Site (LWS) and a GWDTE. WFD surface water body (or part thereof) with overall Moderate or lower status/potential, also any associated upstream non-reportable WFD surface water body or non-WFD surface water body. Groundwater body (or part thereof) with overall Poor status.
	Water use supporting human health and economic activity at household/individual business scale	Water use	CAR-registered non-public surface water and groundwater supply abstraction (and associated catchment), which is small relative to available resource, or where raw water quality is not critical, e.g. cooling water, spray irrigation, mineral washing or permitted discharge. Unregistered potable surface water and groundwater abstraction (and associated catchment) e.g. private domestic water supply, well, spring or permitted discharge.
	Features with a low vulnerability to flooding	Flood risk	Land use type defined as 'Least Vulnerable' in the SPP flood risk land use vulnerability classification (e.g. most types of business premises).

Value	Criteria	Receptor type*	Examples
Very Low	Commonplace features with very low yield or quality with good potential for substitution	Aquatic environment	Conditions supporting an undesignated and low water-dependent ecosystem, including a LWS, GWDTE and pond. Non-reportable WFD surface water body (or part thereof), or non-WFD surface water body, not associated with any downstream WFD surface water body. Non-reportable WFD groundwater body (or part thereof), or non-WFD groundwater body.
	Water use does not support human health, and of only limited economic benefit	Water use	Unregistered non-potable surface water and groundwater abstraction (and associated catchment) e.g. livestock supply.
	Features that are resilient to flooding	Flood risk	Land use type defined as 'Water-compatible use' in the SPP flood risk land use vulnerability classification and undeveloped land (e.g. flood control infrastructure; water transmission infrastructure).

*Receptor types map onto the **Table 11.16** receptor lists as follows:

- Aquatic environment – aquifers and WFD groundwater bodies, watercourses and WFD surface water bodies, conditions supporting GWDTEs and designated conservation sites;
- Water use – springs, abstractions;
- Flood risk – humans, properties and infrastructure. Also acts as a surrogate for Land use – landfill.

11.9.5 The assessment of the value of all the potential receptors identified in **Table 11.16** and using the criteria provided in **Table 11.20** is provided in **Table 11.21**.

Table 11.21 Assessment of Value of Potential Geology, Hydrology and Hydrogeology Receptors

Ref Number	Receptor	Value	Receptor Type and Rationale
Aquifers and WFD groundwater bodies			
AQ01	Bedrock aquifer and Lewis and Harris WFD groundwater body	Medium	Aquatic designation: WFD groundwater body with overall Good status
Landfills			
L01	Bennadrove landfill	Medium	Land use: 'Highly Vulnerable Use' SPP flood risk land use vulnerability classification used as a surrogate for land use value
Springs			
S01	Spring alongside A859	Low	Water use: Spring
Watercourses and associated lochs and lochans and WFD surface water bodies			
W01	Abhainn Lacasdail (including Loch nan Caorann and Loch Garbhaig) watercourse and WFD surface water body	High	Aquatic environment: WFD surface water body with overall Good but High morphology status
W02	Allt Hogaraid	High	Aquatic environment: associated upstream non-WFD surface water body

Ref Number	Receptor	Value	Receptor Type and Rationale
W03	Allt Hulabie	Very Low	Aquatic environment: non-WFD surface water body
W04	Abhainn a' Ghlinn Mhòir (including Loch Airigh na Lic)	Very Low	Aquatic environment: non-WFD surface water body
W05	Allt Airigh na Beiste (including Loch na Beiste Mhòir)	Very Low	Aquatic environment: non-WFD surface water body
W06	Unnamed tributary from Loch a' Leadharain (including Loch a' Leadharain)	High	Aquatic environment: associated upstream non-WFD surface water body
W07	Abhainn Ghrioda (including Loch Bhatandiop, Loch an Ois, Loch a Chlachain) watercourse and WFD surface water body	High	Aquatic designation: WFD surface water body with overall High (including morphology) status
W08	Feadan Loch Lochan (including Loch Speireag)	High	Aquatic environment: associated upstream non-WFD surface water body
W09	Unnamed tributaries of Abhainn Ghrioda to south of Feadan Loch Lochan (including Loch Druim nan Sgorach, Loch Uisg" an t-Solius, Loch Airigh Riabhach, Loch nan Sgiath, Loch Faoileag, Loch a' Bhuna, Loch Breugach, Loch Breag Cnoc a"Choilich)	High	Aquatic environment: associated upstream non-WFD surface water body
W10	Unnamed tributary of Abhainn Ghrioda from Loch Briodag (including Loch Briodag, Loch Cnoc a" Choilich)	High	Aquatic environment: associated upstream non-WFD surface water body
People, properties and infrastructure within areas prone to flooding			
F01	People, properties and infrastructure on the Abhainn Lacasdail downstream of the Development Site	Medium	Flood risk: Land use type defined as 'Highly Vulnerable Use' in the SPP flood risk land use vulnerability classification
F02	People, properties and infrastructure on the Abhainn a' Ghlinn Mhòir downstream of the Development Site	Medium	Flood risk: Land use type defined as 'Highly Vulnerable Use' in the SPP flood risk land use vulnerability classification
Abstractions			
A01	Marybank Quarry (borehole abstraction)	Low	Water use: Small CAR-registered mineral (non-potable) abstraction
A02	Creed Hatchery (abstraction from Abhainn Ghrioda)	Low	Water use: CAR-registered fish hatchery (non-potable) abstraction
A03	Druim Dubh PWS (surface water abstraction)	Low	Water use: Private water supply
A04	Lews Castle PWS (groundwater abstraction)	Low	Water use: Private water supply
Conditions supporting GWDTEs and designated conservation sites			
CS01	Small area of M25a associated with the Abhainn Ghrioda	Low	Aquatic environment: Not designated, but GWDTE within infrastructure buffers

Ref Number	Receptor	Value	Receptor Type and Rationale
CS02	M15b south and adjacent to A858	Low	Aquatic environment: Not designated, but GWDTE within infrastructure buffers
CS03	M15b south and adjacent to A858, on north slopes of Cnoc Loch an Leadharain	Low	Aquatic environment: Not designated, but GWDTE within infrastructure buffers
CS04	M25a south west of Loch a' Leadharain	Low	Aquatic environment: Not designated, but GWDTE within infrastructure buffers
CS05	M15b extending down from catchment divide to Loch a' Leadharain	Low	Aquatic environment: Not designated, but GWDTE within infrastructure buffers
CS06	M15c adjacent to tributary of Abhainn Ghrioda	Low	Aquatic environment: Not designated, but GWDTE within infrastructure buffers
CS07	Strip of M6ci on the north east banks of Loch a' Leadharain	Low	Aquatic environment: Not designated, but GWDTE within infrastructure buffers
CS08	Patch of M15c on slopes of Cnoc Loch a' Leadharain	Low	Aquatic environment: Not designated, but GWDTE within infrastructure buffers
CS09	Patch of M15c on catchment divide at Cnoc Loch a' Leadharain	Low	Aquatic environment: Not designated, but GWDTE within infrastructure buffers
CS10	Linear strip of M15b along southern edge of Bennadrove Landfill	Low	Aquatic environment: Not designated, but GWDTE within infrastructure buffers
CS11	Small area of M6ci on the banks of the Allt Hulabie, at its southern extent	Low	Aquatic environment: Not designated, but GWDTE within infrastructure buffers
CS12	A linear area of M6ci lying along the banks of the Abhainn Lacasdail along the extreme northern boundary of the Proposed Development	Low	Aquatic environment: Not designated, but GWDTE within infrastructure buffers
CS13	A narrow area of M15b fringing the south western edge of Loch Garbhaig	Low	Aquatic environment: Not designated, but GWDTE within infrastructure buffers
CS14	A patch of M15b on the south facing slope of Beinn Hulabaidh	Low	Aquatic environment: Not designated, but GWDTE within infrastructure buffers
CS15	Lewis Peatlands Ramsar and SPA	High	Aquatic environment: conditions supporting a site with an international conservation designation
CS16	Tong Saltings SSSI	High	Aquatic environment: conditions supporting a site with a national conservation designation

11.9.6 The magnitude of change on water receptors is independent of the value of the receptor, and its assessment is semi-quantitative and relies in part on professional judgement. **Table 11.22** provides examples of how various levels of change have been determined with respect to water features.

Table 11.22 Summary of Geology, Hydrology and Hydrogeology Magnitude of Change

Magnitude	Criteria	Receptor type	Example*
High	Results in major change to feature, of sufficient magnitude to affect its use/integrity	Aquatic environment	Deterioration in river flow regime, morphology or water quality, leading to sustained, permanent or long-term breach of relevant conservation objectives (COs) or non-temporary downgrading (deterioration) of WFD surface water body status (including downgrading of individual WFD elements) or dependent receptors, or resulting in the inability of the surface water body to attain Good status in line with the measures identified in the RBMP. Deterioration in groundwater levels, flows or water quality, leading to non-temporary downgrading of status of WFD groundwater body or dependent receptors, or the inability of the groundwater body to attain Good status in line with the measures identified in the RBMP.
		Water use	Complete or severely reduced water availability and/or quality, compromising the ability of water users to abstract.
		Flood risk	Change in flood risk resulting in potential loss of life or major damage to property or infrastructure.
Medium	Results in noticeable change to feature, of sufficient magnitude to affect its use/integrity in some circumstances	Aquatic environment	Deterioration in river flow regime, morphology or water quality, leading to periodic, short-term and reversible breaches of relevant COs, or potential temporary downgrading of surface water body status (including potential temporary downgrading of individual WFD elements), or dependent receptors, although not affecting the ability of the surface water body to achieve future WFD objectives. Deterioration in groundwater levels, flows or water quality, leading to potential temporary downgrading of status of WFD groundwater body or dependent receptors, although not affecting the ability of the groundwater body to achieve future WFD objectives.
		Water use	Moderate reduction in water availability and/or quality, which may compromise the ability of the water user to abstract on a temporary basis or for limited periods, with no longer-term impact on the purpose for which the water is used.
		Flood risk	Change in flood risk resulting in potential for moderate damage to property or infrastructure.

Magnitude	Criteria	Receptor type	Example*
Low	Results in minor change to feature, with insufficient magnitude to affect its use/integrity in most circumstances	Aquatic environment	Slight change in river flow regime or water quality, but remaining generally within COs, and with no short-term or permanent change to WFD surface water body status (of overall status or element status) or dependent receptors. Slight deterioration in groundwater levels, flows or water quality, but with no short-term or permanent downgrading of status of WFD groundwater body or dependent receptors.
		Water use	Minor reduction in water availability and/or quality, but unlikely to affect the ability of a water user to abstract.
		Flood risk	Change in flood risk resulting in potential for minor damage to property or infrastructure.
Very Low	Results in little change to feature, with insufficient magnitude to affect its use/integrity	Aquatic environment	Very slight change in river flow regime or water quality, and no consequences in terms of COs or surface water body status or dependent receptors. Very slight change in groundwater levels or quality, and no consequences in terms of status of WFD groundwater body or dependent receptors.
		Water use	Very slight change in water availability or quality and no change in ability of the water user to exercise licensed rights or continue with small private abstraction.
		Flood risk	Increased frequency of flood flows, but which does not pose an increased risk to property or infrastructure.

*For the purposes of this assessment of change, relevant WFD elements for surface water body classification include:

- All biological quality elements e.g. fish, macrophytes, invertebrates;
- All physico-chemical quality elements e.g. dissolved oxygen, phosphate;
- Hydromorphological supporting elements;
- Priority Hazardous Substances;
- Priority Substances;
- Specific Pollutants; and, for Artificial and Heavily Modified Water Bodies,
- The mitigation measures assessment.

For the purposes of this assessment of change, relevant WFD characteristics for groundwater body classification are quantity (groundwater level regime) and chemistry (conductivity and source of pollutants), as determined by the following tests:

- Water balance (quantitative);
- DWPAs (chemical);
- General Quality Assessment (chemical);
- Saline and other intrusions (quantitative and chemical);
- Surface water (quantitative and chemical); and
- GWDTEs (quantitative and chemical).

11.9.7 The EIA Regulations require that a final judgement is made about whether the effects are likely to be significant. The significance of water-related effects is derived by considering both the value of the feature and the magnitude of change. In this assessment, effects are assessed as being significant or not significant as per the matrix in **Table 11.23**, with *'Major'* and most *'Moderate'* effects taken to be *'Significant'*. Significance can be *'Beneficial'*, *'Adverse'* or *'Neutral'*.

Table 11.23 Significance Evaluation Matrix Relating to the Water Environment

		Magnitude of change			
		High	**Medium**	**Low**	**Very Low**
Value	**High**	Major (Significant)	Major (Significant)	Moderate (Probably significant)	Minor (Not significant)
	Medium	Major (Significant)	Moderate (Probably significant)	Minor (Not significant)	Negligible (Not significant)
	Low	Moderate (Probably significant)	Minor (Not significant)	Negligible (Not significant)	Negligible (Not significant)
	Very Low	Minor (Not significant)	Negligible (Not significant)	Negligible (Not significant)	Negligible (Not significant)

Note: 'Significant' effects are those identified as 'Major'. 'Moderate' effects would normally be deemed to be 'significant'. However, there may be some exceptions, depending on the environmental topic and the application of professional judgment.

11.9.8 It is important to recognise that *'significant'* effects on receptors in the water environment does not necessarily mean that the same outcomes would occur in respect of the same receptors that may also be ecology receptors. Indeed, because of the different value and magnitude criteria used by the two assessments, it is possible that effects assessed as *'Not significant'* in one environmental topic assessment, e.g. the water environment, can still sit alongside effects assessed as *'Significant'* in another environmental topic assessment, e.g. ecology, and vice-versa.

11.10 Assessment of Geology, Hydrology and Hydrogeology Effects

Bedrock Aquifer and WFD groundwater body (AQ01)

11.10.1 Based on the water environment baseline presented in **Section 11.5**, **Section 11.7** identified one aquifer and WFD groundwater body in the area as requiring consideration as part of the EIA; namely the low productivity bedrock aquifer and the Lewis and Harris WFD groundwater body (AQ01).

11.10.2 **Section 11.7** also observed that loss or contamination of the water resource could occur as a result of soil compaction and the introduction of areas of hardstanding during construction and throughout operation reducing recharge and groundwater levels; dewatering during the excavation of the turbine foundations and borrow pits could lead to a decline in groundwater levels and possibly also induced leakage of contaminants from Bennadrove Landfill; and site activities during all development phases could result in the release of pollutants and the subsequent contamination of groundwater.

11.10.3 Whilst the aquifer is of very low productivity (BGS, 2004) and is not exploited on the Development Site, it constitutes part of the WFD Lewis and Harris groundwater body (WB03), and is therefore considered of medium value (**Table 11.21**).

11.10.4 Mitigation that looks to protect the aquifer includes adherence to the CEMP, BS6031: 2009 Code of Practice for Earth Works, WAT-SG-29 on Temporary Construction Methods and any dewatering

CAR registration or licence requirements (**Section 11.8**). The limited extent of the proposed works compared to the area of both the Development Site and the regional aquifer, the low permeability of the aquifer, and the anticipated effectiveness of the embedded environmental measures combine to limit the magnitude of change to the aquifer and WFD groundwater body baseline condition.

11.10.5 The magnitude of change on the aquifer and WFD groundwater body with respect to the soil compaction and hardstanding (groundwater levels), turbine foundation and borrow pit dewatering (groundwater levels and water quality), and site activities (groundwater quality) is therefore very low (**Table 11.22**) i.e. very slight change in groundwater levels and/or quality. On this basis, the level of effect on the aquifer and WFD groundwater body is negligible adverse and not significant (**Table 11.23**).

Bennadrove Landfill (L01)

11.10.6 Based on the water environment baseline presented in **Section 11.5**, **Section 11.7** identified one landfill within the Study Area as requiring consideration as part of the EIA; namely Bennadrove Landfill.

11.10.7 **Section 11.7** also observed that disruption of the landfill operation could occur as a result of areas of hardstanding during construction and throughout operation reducing recharge and groundwater levels and subsequent differential settlement and heave and damage to the landfill's basal liner; and dewatering during construction associated with the excavation of the turbine foundations and borrow pits could lead to a decline in groundwater levels and subsequent differential settlement and heave and damage to the landfill's basal liner.

11.10.8 Landfill is a land use defined as a 'Highly Vulnerable Use' in the SPP flood risk land use vulnerability classification, and this classification is used as a surrogate to assess Bennadrove Landfill's value as medium (**Table 11.21**).

11.10.9 Mitigation that would serve to help protect the landfill includes restricting wind farm development in its vicinity, and adherence to the CEMP, BS6031: 2009 Code of Practice for Earth Works, WAT-SG-29 on Temporary Construction Methods and any dewatering CAR registration or licence requirements (**Section 11.8**), including returning water to ground where possible. The absence of any proposed works within 100m of Bennadrove Landfill, the low permeability of the aquifer and peat, and the anticipated effectiveness of the embedded environmental measures combine to limit the magnitude of change to the landfill operation.

11.10.10 The magnitude of change on the landfill with respect to the disruption of the basal liner and release of contaminants (groundwater level and quality) is therefore very low (**Table 11.22**) i.e. very slight change in groundwater levels and/or quality. On this basis, the level of effect on the landfill is negligible adverse and not significant (**Table 11.23**).

Spring Alongside A859 (S01)

11.10.11 Based on the water environment baseline presented in **Section 11.5**, **Section 11.7** identified one spring within the Study Area as requiring consideration as part of the EIA, namely a spring alongside the A859 carriageway.

11.10.12 **Section 11.7** also observed that derogation or contamination of the spring could occur as a result of soil compaction and the introduction of areas of hardstanding during construction and throughout operation could reduce recharge and groundwater levels; dewatering during the excavation of the turbine foundations and borrow pits could lead to a decline in groundwater; and site activities during construction, operation and decommissioning resulting in the release of pollutants and the subsequent contamination of groundwater.

11.10.13 The spring may only exist due to a previous lateral flowpath being interrupted by the road and is likely to constitute shallow groundwater from lateral flows through the peat. Like all springs, it is considered of low value (**Table 11.20**).

11.10.14 Mitigation that would serve to help protect the spring includes applying a 50m watercourse buffer zone, and adherence to the CEMP, BS6031: 2009 Code of Practice for Earth Works, WAT-SG-29 on Temporary Construction Methods and any dewatering CAR registration or licence requirements (**Section 11.8**). The absence of any proposed works within 300m of the spring, the low permeability of the aquifer and peat, and the anticipated effectiveness of the embedded environmental measures combine to limit the magnitude of change to the spring.

11.10.15 The magnitude of change on the spring with respect to the disruption and/or pollution of its flow (groundwater level and quality) is therefore very low (**Table 11.22**) i.e. very slight change in water availability and/or quality. On this basis, the level of effect on the spring is negligible adverse and not significant (**Table 11.23**).

Watercourses and Associated Lochs and Lochans and WFD Surface Water Bodies (W01-W10)

11.10.16 Based on the water environment baseline presented in **Section 11.5**, **Section 11.7** identified ten watercourses and associated lochs and lochans and WFD surface water bodies within the Study Area as requiring consideration as part of the EIA. These comprise the three main rivers, from north to south Abhainn Lacasdail (W01), Abhainn a' Ghlinn Mhòir (W04) and Abhainn Ghrioda (W07), together with their tributaries, namely Allt Hogaraid (W02, draining into Abhainn Lacasdail), Allt Hulabie and Allt Airigh na Beiste (W03 and W05 respectively, draining into Abhainn a' Ghlinn Mhòir), and the unnamed tributary from Loch a' Leadharain, the Feadan Loch Lochan, numerous unnamed tributaries with many lochans further to the south of Feadan Loch Lochan, and the unnamed tributary from Loch Briodag (W06 and W08-10 respectively, draining into Abhainn Ghrioda). The Abhainn Lacasdail and Abhainn Ghrioda watercourses also constitute WFD surface water bodies.

11.10.17 **Section 11.7** also observed that changes in flow and morphology and also sediment loading and pollution of watercourses, lochs and lochans and WFD surface water bodies could occur as a result of soil compaction and the introduction of areas of hardstanding during construction and throughout operation increasing runoff and sediment loading; disruption of flow paths and changes to drainage regime during construction and throughout operation could be associated with increases in runoff and less on-site water retention; disruption of ground during construction could lead to increased sediment loading; dewatering and/or drainage during construction could disrupt groundwater support (baseflow) to watercourses; discharge to surface water of groundwater intercepted during the excavation of the turbine foundations and borrow pits could increase flows and sediment loading; and site activities during all development phases could result in the release of pollutants and the subsequent contamination of surface waters.

11.10.18 Whilst all watercourses are only regarded as local water resources, with only the Abhainn Ghrioda currently supporting a CAR-registered abstraction, the Abhainn Lacasdail and Abhainn Ghrioda constitute WFD surface water bodies. Therefore, in terms of water resources these main watercourses (W01 and W07) and, by association, their tributaries (W02 and W06 and W08 – W10 respectively) are considered of high value (**Table 11.21**). The other watercourses in the Study Area (W03 – W05) generally have smaller catchments and support lower flows and are not identified or associated with WFD surface water bodies and are therefore considered to be very low value.

11.10.19 Mitigation that looks to protect surface watercourses is extensive (**Section 11.8**). It includes a 50m buffer zone applied to the entire river network, micro-siting of turbines, tracks and other infrastructure, careful access track drainage and watercourse crossing design (e.g. **Table 11.18**), and adherence to numerous relevant protocols, including the CEMP, SEPA's good practice guidance regarding wind farm construction (2015) and the construction of river crossings, the FCS and SNH (2010) guidance, BS6031: 2009 Code of Practice for Earth Works, WAT-SG-29 on Temporary Construction Methods and any dewatering CAR registration or licence requirements (**Section 11.8**). Any dewatering would necessitate the use of silt traps, fences, straw bales, settlement lagoons, swales and SUDS, and any discharge to surface water would require consent from SEPA and would be subject to conditions attached to the consent. Other pollution prevention and emergency response planning are also relevant.

11.10.20 The magnitude of change and significance of effects are considered on a watercourse-by-watercourse basis below. Recognising that some of the watercourses are tributaries of others, the assessment for the downstream watercourses has also taken account of activities in the upstream tributaries.

11.10.21 The Abhainn Lacasdail (W01) catchment contains six proposed turbines (T25-27 and T32-34), short sections of associated tracks, and no watercourse crossings. The catchment of its tributary, the Allt Hogaraid (considered separately as W02, see below) contains one proposed turbine (T31) and associated track, and no watercourse crossings or borrow pit search areas. Two of the turbines (T33 and T34) are close to the Allt Hogaraid catchment divide, several hundred metres away from the Abhainn Lacasdail, and all the remaining turbines and tracks lie outside its 50m buffer zone. This, together with the absence of watercourse crossings and the anticipated effectiveness of the other embedded environmental measures, indicates that the magnitude of change on the watercourse and WFD surface water body with respect to the disruption and/or pollution of its flow (surface water flow and quality) and its geomorphology is therefore very low (**Table 11.22**) i.e. very slight change in river flow regime and/or water quality. On this basis, the level of effect on the watercourse and WFD surface water body is minor adverse and not significant (**Table 11.23**).

11.10.22 As noted above, the Allt Hogaraid (W02) catchment contains one proposed turbine (T31) and associated track, no watercourse crossings and one borrow pit search area. The turbine, tracks and borrow pit lie outside its 50m buffer zone. This, together with the absence of watercourse crossings and the anticipated effectiveness of the other embedded environmental measures, indicates that the magnitude of change on the watercourse with respect to the disruption and/or pollution of its flow (surface water flow and quality) and its geomorphology is therefore very low (**Table 11.22**) i.e. very slight change in river flow regime and/or water quality. On this basis, the level of effect on the watercourse is minor adverse and not significant (**Table 11.23**).

11.10.23 The Allt Hulabie (W03) catchment contains three proposed turbines (T28-30), associated tracks, and no- borrow pit search area. Two of the turbines (T29 and T30) are several hundred metres away from the Allt Hulabie, whilst the remaining turbine (T28) lies outside its 50m buffer zone. However, the proposed tracks cross a poorly defined channel and the Allt Hulabie itself, which would require an upgrade to an existing track. Despite the requirement for these two watercourse crossings, the anticipated effectiveness of the embedded environmental measures means that the magnitude of change on the watercourse with respect to the disruption and/or pollution of its flow (surface water flow and quality) and its geomorphology is assessed as very low (**Table 11.22**) i.e. very slight change in river flow regime and/or water quality. On this basis, the level of effect on the watercourse is negligible adverse and not significant (**Table 11.23**).

11.10.24 The Abhainn a' Ghlinn Mhòir (W04) catchment contains four proposed turbines (T20-22 and T35) and associated tracks, a secondary substation, a storage/laydown area, and part of a borrow pit search area. It also has two tributaries, namely the Allt Hulabie (W03, see above) and the Allt Airigh na Beiste (W05, with two turbines (T23 and T24) and associated track, see below). All turbines, associated tracks and other infrastructure in the two catchments are more than 150m from the main watercourse. However, one new watercourse crossing is proposed across the Abhainn a' Ghlinn Mhòir, as well as an upgrade to an existing crossing elsewhere in the catchment and, as mentioned previously, there are two watercourse crossings in the Allt Hulabie (W03) catchment. Despite the requirement for these four watercourse crossings, the anticipated effectiveness of the embedded environmental measures means that the magnitude of change on the watercourse with respect to the disruption and/or pollution of its flow (surface water flow and quality) and its geomorphology is very low (**Table 11.22**) i.e. very slight change in river flow regime and/or water quality. On this basis, the level of effect on the watercourse is negligible adverse and not significant (**Table 11.23**).

11.10.25 As noted above, the Allt Airigh na Beiste (W05) catchment contains two proposed turbines (T23 and T24) and associated track, but the closest infrastructure to the watercourse (T24) is 100m away. This, together with the absence of watercourse crossings and borrow pits and the anticipated effectiveness of the other embedded environmental measures, indicates that the magnitude of change on the watercourse with respect to the disruption and/or pollution of its flow (surface water flow and quality) and its geomorphology is therefore very low (**Table 11.22**) i.e. very slight change in river flow regime and/or water quality. On this basis, the level of effect on the watercourse is negligible adverse and not significant (**Table 11.23**).

11.10.26 The Loch a' Leadharain and the unnamed watercourse downstream (W06) is a tributary of the Abhainn Ghrioda. The catchment contains no turbine locations, but has the main access track from the A859, the main substation, a storage/laydown area and part of a borrow pit search area. The proposed route of the track crosses the poorly defined channel downstream of the loch as well as three other minor channels, and passes the CnES Marybank salt store, which currently contains an uncovered and unbunded salt pile that is known to leach into the environment, including the watercourse. Despite the requirement for four watercourse crossings, the anticipated effectiveness of the embedded environmental measures means that the magnitude of change on the watercourse with respect to the disruption and/or pollution of its flow (surface water flow and quality) and its geomorphology is very low (**Table 11.22**) i.e. very slight change in river flow regime and/or water quality. On this basis, the level of effect on the watercourse is minor adverse and not significant (**Table 11.23**).

11.10.27 The Abhainn Ghrioda (W07) catchment comprises the Abhainn Ghrioda and several unnamed tributaries to the north. The catchment includes nine proposed turbines (T9, T12-19), associated tracks, part of a secondary substation, a storage/laydown area and two borrow pit search areas. The Abhainn Ghrioda also has a number of tributaries that have been assigned their own catchments, including Loch a' Leadharain and its unnamed tributary (W06, see above), the Feadan Loch Lochan (W08, see below), numerous unnamed tributaries with many lochans further to the south of Feadan Loch Lochan (W09, see below), and the unnamed tributary from Loch Briodag (W10, see below). These are considered individually, although they are also included within this assessment for the Abhainn Ghrioda itself. Together these tributary catchments contain a further ten proposed turbine locations (T1, T2, T3-T8, T10 and T11) and associated tracks, the southern access track, the construction compound, the other part of the secondary substation, and a borrow pit. All turbines, associated tracks and other infrastructure in the main and subsidiary catchments lie outside the 50 m watercourse buffer zones. However, there are two watercourse crossings in the W07 catchment, one of the Abhainn Ghrioda itself and the other of one of the small unnamed tributaries, and there are also a further ten watercourse crossings in the other tributary catchments. Despite the requirement for twelve watercourse crossings, the anticipated effectiveness of the embedded environmental measures means that the magnitude of change on the watercourse and WFD surface water body with respect to the disruption and/or pollution of its flow (surface water flow and quality) and its geomorphology is very low (**Table 11.22**) i.e. very slight change in river flow regime and/or water quality. On this basis, the level of effect on the watercourse and WFD surface water body is minor adverse and not significant (**Table 11.23**).

11.10.28 The Feadan Loch Lochan (W08) catchment contains five proposed turbine locations (T1, T2, T8, T10 and T11), associated tracks, part of a secondary substation but no borrow pit search area. All of the turbines, associated tracks and other infrastructure lie outside the 50 m watercourse buffer zone. However, the proposed route of the access tracks crosses the main watercourses upstream and downstream of Loch Speireag. Despite the requirement for these two watercourse crossings, the anticipated effectiveness of the embedded environmental measures means that the magnitude of change on the watercourse with respect to the disruption and/or pollution of its flow (surface water flow and quality) and its geomorphology is assessed as very low (**Table 11.22**) i.e. very slight change in river flow regime and/or water quality. On this basis, the level of effect on the watercourse is minor adverse and not significant (**Table 11.23**).

11.10.29 The catchment of the numerous unnamed tributaries with many lochans further to the south of Feadan Loch Lochan (W09) contains five proposed turbine locations (T3-7), associated tracks, the construction compound and one borrow pit search area. All turbines, associated tracks and other infrastructure lie outside the 50m watercourse buffer zone. However, the proposed route of the access track crosses the main watercourse twice in its downstream reaches, as well as a poorly defined channel downstream of Loch Breag Cnoc a' Choilich. Despite the requirement for these three crossings, the anticipated effectiveness of the embedded environmental measures means that the magnitude of change on the watercourse with respect to the disruption and/or pollution of its flow (surface water flow and quality) and its geomorphology is assessed as very low (**Table 11.22**) i.e. very slight change in river flow regime and/or water quality. On this basis, the level of effect on the watercourse is minor adverse and not significant (**Table 11.23**).

11.10.30 The catchment of the unnamed tributary from Loch Briodag (W10) is crossed by the southern access track from the A859. The proposed track route crosses a poorly defined channel that represents the outflow from Loch Briodag. Despite the requirement for this watercourse crossing, the anticipated effectiveness of the embedded environmental measures means that the magnitude of change on the watercourse with respect to the disruption and/or pollution of its flow (surface water flow and quality) and its geomorphology is assessed as very low (**Table 11.22**) i.e. very slight change in river flow regime and water quality. On this basis, the level of effect on the watercourse is minor adverse and not significant (**Table 11.23**).

People, Properties and Infrastructure within Areas Prone to Flooding (F01 and F02)

11.10.31 Based on the water environment baseline presented in **Section 11.5**, **Section 11.7** identified potential flooding effects on areas alongside two of the main rivers downgradient the site, namely Abhainn Lacasdail (F01) and Abhainn a' Ghlinn Mhòir (F02).

11.10.32 **Section 11.7** also observed that these potential flood risk effects on people, property and infrastructure could occur as a result of soil compaction; the introduction of areas of hardstanding and changes of land use (e.g. deforestation) during construction and throughout operation increasing runoff; disruption of flow paths and changes to drainage regime during construction and throughout operation associated with increased runoff and less on-site water retention; and discharge to surface water of groundwater intercepted during the excavation of the turbine foundations and borrow pits and increasing flows.

11.10.33 The Abhainn Lacasdail and Abhainn a' Ghlinn Mhòir watercourses are also represented elsewhere in the assessment, as watercourses (W01 and W04 respectively), with the former also a WFD surface water body. The two predominantly residential areas are ~1km and 1.2km respectively downstream of the Development Site. They comprise a land use type defined as 'Highly Vulnerable' in the SPP flood risk land use vulnerability classification and are therefore regarded as of medium value receptors (**Table 11.21**).

11.10.34 Mitigation for flood risk includes the following commitments: implementing a site drainage plan via a WMP that does not increase runoff rates from the Development Site during construction and operations above pre-development rate; no development within the 1 in 100 year fluvial floodplain, with the exception of watercourse crossings; and designing watercourse crossings to ensure that flood conveyance and storage is not reduced for all events up to the 1 in 200 year event (**Section 11.8**). The limited extent of the proposed works compared to the area of the river catchments and the anticipated effectiveness of the embedded environmental measures combine to limit the magnitude of change to the baseline flood risk.

11.10.35 The magnitude of change in flood risk to the two downstream residential areas arising from the Proposed Development is therefore very low (**Table 11.22**) i.e. no increased flood risk. On this basis, the level of flood risk effect for both areas is negligible adverse and not significant (**Table 11.23**).

Abstractions (A01-A04)

11.10.36 Based on the water environment baseline presented in **Section 11.5**, **Section 11.7** identified potential effects on four abstractions beyond (not within) the Study Area as requiring consideration as part of the EIA; namely Marybank Quarry (A01), Creed Hatchery (A02), Drium Dubh (A03) and Lews Castle (A04).

11.10.37 **Section 11.7** also observed that changes in water levels and quality that result in reduction in yield and/or pollution of groundwater abstractions could occur as a result of soil compaction and the introduction of areas of hardstanding during construction and throughout operation reducing recharge and groundwater levels; dewatering during construction associated with the excavation of the turbine foundations and borrow pits could lead to a decline in groundwater levels and possibly also induced leakage of contaminants from Bennadrove Landfill; and site activities during all development phases could result in the release of pollutants and the subsequent contamination of groundwater. Changes in flows and quality that result in derogation and/or pollution of surface water abstractions could also occur as a result of soil compaction and the introduction of areas of hardstanding during construction and throughout operation increasing runoff and sediment loading; disruption of ground during construction could lead to increased sediment loading; dewatering and/or drainage during construction could disrupt groundwater support (baseflow) to watercourses; discharge to surface water of groundwater intercepted during the excavation of the turbine foundations and borrow pits could increase flows and sediment loading; and site activities during all development phases could result in the release of pollutants and the subsequent contamination of surface waters.

11.10.38 These abstractions are a mix of CAR-registered abstractions (A01 and A02) and PWSs (A03 and A04), and are also a mix of source types, A01 and A04 being sourced from groundwater (presumably the bedrock aquifer, AQ01) and A02 and A03 from surface water (Abhainn Ghrioda (W07) and an unnamed inflow to Loch Lathamul respectively). The abstractions all appear to be small, less than $10m^3/d$, and therefore their catchment areas are likely to be very local and outwith the Development Site, with the exception of A02 on the Abhainn Ghrioda, whose catchment (together with that of its tributaries) covers much of the southern half of the Development Site. Based on their CAR and PWS status, all the abstractions are assessed to be of low value (**Table 11.21**).

11.10.39 The majority of the mitigation presented in **Section 11.8** is relevant to the protection of the quantity and quality of these abstractions, in particular the avoidance of development within the precautionary 250m buffers around the A01 and A04 groundwater abstractions and the watercourse buffers and the watercourse crossing design upstream of the A03 surface water abstraction. The distance of the A01, A03 and A04 source zones from the Development Site, together with the anticipated effectiveness of the embedded environmental measures, combine to limit the magnitude of change to all these abstractions.

11.10.40 The magnitude of change on the abstractions is therefore very low (**Table 11.22**) i.e. very slight change in water availability and/or quality. On this basis, the level of effect is negligible adverse and not significant (**Table 11.23**).

Conditions Supporting GWDTEs and Designated Conservation Sites (CS01-CS16)

11.10.41 Based on the water environment baseline presented in **Section 11.5**, **Section 11.7** identified potential effects on water conditions supporting fourteen GWDTEs and one combined designated conservation site within the Study Area and one designated conservation site downgradient of the Study Area as requiring consideration as part of the EIA.

11.10.42 **Section 11.7** also observed that with respect to groundwater support, changes in water levels and quality could occur as a result of soil compaction and the introduction of areas of hardstanding during construction and throughout operation reducing recharge and groundwater levels; dewatering during the excavation of the turbine foundations and borrow pits could lead to a decline in groundwater levels and possibly also induced leakage of contaminants from Bennadrove Landfill; and site activities during all development phases could result in the release of pollutants and the subsequent contamination of groundwater. For surface water support, changes in water flow and quality could occur as a result of soil compaction and the introduction of areas of hardstanding during construction and throughout operation increasing runoff and sediment loading; disruption of flow paths and changes to drainage regime during construction and throughout operation could result in increases in runoff and less on-site water retention; disruption of ground during construction could lead to increased sediment loading; dewatering and/or drainage during construction, disrupting groundwater support (baseflow) to watercourses; discharge to surface water of groundwater intercepted during the excavation of the turbine foundations and borrow pits could increase flows and sediment loading; and site activities during all development phases could result in the release of pollutants and the subsequent contamination of surface waters. Physical disturbance of the peat could also occur as a result of excavation works and peat stockpiling/removal, though the consequential effects of these changes on habitats are addressed in **Chapter 9.**

11.10.43 The fourteen GWDTEs highly/moderately dependent on groundwater are all undesignated, and on this basis are considered of low value (**Table 11.21**). The Ramsar/SPA combined designated conservation site in the Study Area is of international importance, and so is of high value, whilst the downgradient Tong Saltings SSSI is of national importance, and is therefore judged of medium value.

11.10.44 All the GWDTEs sit within the SEPA LUPS-GU31 infrastructure buffers, but the majority of the mitigation presented in **Section 11.8** is relevant to the protection of the quantity and quality of the groundwater and surface water supporting and maintaining the peat structure. Mitigation of particular relevance is the avoidance of development where possible on steep gradients, within deep peat deposits and in conservation site buffer zones, adherence to the CEMP and careful infrastructure design.

11.10.45 Bearing this in mind, the magnitude and level/significance of the effects are considered on a GWDTE-by-GWDTE basis in **Appendix 11F: GWDTE RISK Assessment**. For most GWDTEs the magnitude of change is very low to medium (**Table 11.22**), i.e. very slight change in river flow regime, groundwater levels and/or water quality, and therefore negligible adverse to minor adverse and not significant (**Table 11.23**). However, at two of the GWDTEs, namely CS08 and CS09 (patches of M15c on the slopes and the catchment divide at Cnoc Loch a' Leadharain respectively), the proposed borrow pit and central/main substation near the northern site entrance extend onto the habitats and their catchments. This would result in dewatering, flow path and ground disruption and discharge to surface water effects that are high in magnitude, i.e. marked deterioration in river flow regime, groundwater levels and/or water quality, and therefore moderate adverse and **probably significant**. However, as discussed earlier (e.g. **Section 11.7**), the assessment presented here is in respect to the water environment supporting the GWDTEs, not the habitats themselves, and whether further borrow pit mitigation is required to address this conservation site risk is discussed in the Mitigation Measures section of this Chapter (**Section 11.12**), and with reference to the **Chapter 9** ecology assessment for the wider-scale wet heath and blanket bog habitat.

11.10.46 The Ramsar and SPA is adjacent to, but does not extend onto, the Development Site in the north, west and south. Based on the infrastructure buffers shown on **Figures 11.9a-c**, some turbines and associated tracks are sufficiently close to the boundary of the designated conservation site (within the SEPA LUPS-GU31 250m buffer) to potentially impact its margins. However, mitigation presented in **Section 11.8** is relevant to its protection, particularly adherence to the CEMP and careful infrastructure design. The upgradient location and distance of the conservation site from the majority of the proposed infrastructure, the limited extent of the Proposed Development's ZoI compared to the large extent of the conservation site, and the anticipated effectiveness of the embedded environmental measures, combine to limit the magnitude of change to the Ramsar and SPA.

11.10.47 The magnitude of change on the conditions supporting the Ramsar and SPA is therefore very low (**Table 11.22**) i.e. very slight change in river flow regime, groundwater levels and/or water quality. On this basis, the level of effect is minor adverse and not significant (**Table 11.23**).

11.10.48 The Tong Saltings SSSI is 3.5km downgradient of the Development Site, but the Abhainn Lacasdail (W01) connects them and would be the potential pathway of any, albeit diluted, effects. Mitigation that looks to protect this and other surface watercourses is extensive (**Section 11.8**). It includes a 50m buffer zone applied to the entire river network, micro-siting of turbines, tracks and other infrastructure, careful access track drainage and watercourse crossing design (e.g. **Table 11.18**), and adherence to numerous relevant protocols, including the CEMP, SEPA's good practice guidance regarding wind farm construction (2015) and the construction of river crossings, the FCS and SNH (2010) guidance, BS6031: 2009 Code of Practice for Earth Works, WAT-SG-29 on Temporary Construction Methods and any dewatering CAR registration or licence requirements (**Section 11.8**). Any dewatering would necessitate the use of silt traps, fences, straw bales, settlement lagoons, swales and SUDS, and any discharge to surface water would require consent from SEPA and would be subject to conditions attached to that consent. Other pollution prevention and emergency response planning are also relevant. The distance between Tong Saltings SSSI and the Proposed Development, the intervening dilution and the anticipated effectiveness of the embedded environmental measures, combine to limit the magnitude of change.

11.10.49 The magnitude of change on the conditions supporting the SSSI is therefore very low (**Table 11.22**), i.e. very slight change in river flow regime and/or water quality, mirroring that on the Abhainn Lacasdail (W01). On this basis, the level of effect is negligible adverse and not significant (**Table 11.23**).

11.10.50 A summary of the results of the assessment of the geology, hydrology and hydrogeology is provided in **Appendix 11G: Summary of significance of predicted geology, hydrology and hydrogeology effects** (Table 11G.1).

11.11 Assessment of Cumulative Effects

11.11.1 As outlined in **Section 2.8**, consideration has been given as to whether any of the geology, hydrology and hydrogeology receptors that have been taken forward for assessment in this chapter are likely to be subject to cumulative effects in combination with effects generated by other consented (but not yet built) and proposed developments.

11.11.2 It has been determined that there are no consented or proposed developments within the Development Site or wider Study Area or in the same surface catchments, wind farm or otherwise, that could result in cumulative effects when considered in combination with the Proposed Development proposal.

11.12 Consideration of Additional Mitigation or Compensation

11.12.1 The assessment set out in **Section 11.10** concluded that it may be appropriate to implement some further mitigation measures. These have been identified through the iterative process of scheme design and would be in addition to those outlined and assessed earlier. The need and form of such additional mitigation is summarised below.

Borrow Pit

11.12.2 The borrow pit search area near the northern site entrance encroaches into the CS08 and CS09 habitats and catchments on Cnoc Loch a' Leadharain. To mitigate the borrow pit effect on the water environment supporting these GWDTEs, the borrow pit could theoretically be micro-sited by up to 100m to the east. However, when considering the effects on habitats rather than the water conditions supporting these habitats, **Chapter 9** is focussed instead on the wider-scale wet heath and blanket bog habitat and the adoption of a HMP (**Appendix 9I**). As a result, borrow pit micro-siting is not being advocated.

Water Quality

11.12.3 To establish whether there are any effects on surface water quality, both in the immediate vicinity of the Marybank salt store and elsewhere on the Development Site, a monitoring programme would be developed in consultation with SEPA. Additional remedial action would be taken if pollution relating to the construction, operation and/or decommissioning was identified.

11.13 Conclusions of Significance Evaluation

11.13.1 The summary of the significance of predicted hydrological, hydrogeological and flood risk effects are presented in **Appendix 11G** (Table 11G.1**).** This indicates that based on the environmental baseline and embedded mitigation described in **Sections 11.5** and **11.8** respectively most effects as a result of the Proposed Development in isolation are not significant. The potential **probably significant** adverse effects relate to the water conditions supporting the CS08 and CS09 GWDTEs and catchments on Cnoc Loch a' Leadharain. The GWDTE risks are principally due to the proposed excavation of a borrow pit across the two habitats and their catchments.

11.13.2 **Section 11.11** indicates that there are no cumulative water effects with consented developments within the Development Site or wider Study Area or in the same surface catchments.

11.13.3 Based on the above assessments additional mitigation over that embedded in the design has been considered in **Section 11.12**. Borrow pit micro-siting is contemplated but is not advocated, because in considering the wider scale wet heath and blanket bog habitat rather than the water conditions supporting the local GWDTEs , **Chapter 9** advocates the adoption of a HMP (**Appendix 9I**). However, an agreed water quality 'monitoring and respond' programme is recommended.

11.13.4 On this basis, with both embedded and additional mitigation in place, standalone and cumulative effects of the Proposed Development on all water receptors are not significant, with the exception of conditions supporting two GWDTES, which are in any case not considered a concern in the overriding **Chapter 9** ecology assessment.

11.14 Implementation of Environmental Measures

11.14.1 **Table 11.24** describes the environmental measures (embedded and additional) included within the Proposed Development and the means by which they would be implemented i.e. they would have been secured through the CAR authorisation process and planning conditions.

Table 11.24 Summary of Environmental Measures to be Implemented, Relating to Geology, Hydrology and Hydrogeology

Environmental measure	Responsibility for implementation	Compliance mechanism
Pre-construction works: detailed design of watercourse crossings and cable trenching	Geotechnical and design teams	Approval of watercourse crossing design through CAR authorisation process.
Construction and maintenance of bunding and other works around CnES salt store	Site management	Construction method statements followed, secured by planning condition.
Construction and maintenance of watercourse crossings	Site management	Construction method statements followed, secured by planning condition.
Micro-siting of tracks, turbines, borrow pits and other infrastructure during construction	ECoW	Construction method statements followed, secured by planning condition.
Implementation of best practice in construction in relation to drainage, soil handling and other potential sources of pollution (e.g. oil)	Site management	Construction method statements and best practice guidance followed, secured by planning condition and CAR authorisation process.
Implementation of best practice in operation, including preventing spills and maintenance of infrastructure	Site management	Ongoing monitoring (see below).
Design and implementation of water quality monitoring in surface watercourses- baseline and construction phases. Targeted monitoring to continue through operational phase	ECoW	Secured by planning condition.

11.15 References

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12. Noise

Non-Technical Summary

The likely effects from noise on nearby residences from the construction and operation of the Stornoway Wind Farm have been assessed. The results of background noise monitoring presented in the 2011 ES remain applicable for this EIA Report, as agreed with CnES. As baseline noise levels normally increase over time, the use of this data to represent residential receptors is considered a conservative approach. The residential receptors and criteria within the EIA Report remain the same as within the 2011 ES.

The noise from the Proposed Development has been predicted using computer noise modelling incorporating international calculation methodology and the latest guidance on wind farm assessment. The predictions have been completed for two scenarios; the Proposed Development in isolation and another with other nearby wind farms contributing to noise at identified residential locations. The results show that predicted wind farm noise in both scenarios do not exceed noise limits. Therefore, the effect of noise from the operation of the Proposed Development would be not significant.

12.1 Introduction

12.1.1 This chapter assesses the likely significant effects of the Proposed Development with respect to Noise and should be read in conjunction with the development description provided in **Chapter 4: Project Description**.

12.2 Limitations of this Assessment

12.2.1 There are no limitations relating to noise that affect the robustness of the assessment of the likely significant effects of the Proposed Development.

12.3 Relevant Legislation, Planning Policy, Technical Guidance

Legislative Context

12.3.1 The following legislation is relevant to the assessment of the effects on noise receptors:

- The Town and Country Planning (Scotland) Act 1997; and
- Control of Pollution Act 1974.

Planning Policy Context and Technical Guidance

12.3.2 A summary of the relevant planning policies and technical guidance used to prepare this assessment is given in **Table 12.1.**

Table 12.1 Policy and Guidance Considered in Preparing the Noise Assessment

Policy/Guidance Reference	Policy/Guidance Content
Planning Advice Note 1/2011: Planning and Noise	PAN 1/2011 provides general guidance and advice on the role of the planning system in helping to prevent and limit the adverse effects of noise.

Policy/Guidance Reference	Policy/Guidance Content
Technical Advice Note: Assessment of Noise	This TAN provides guidance on the technical evaluation of noise including methods, criteria and refers to ETSU-R-97.
Outer Hebrides Local Development Plan: Adopted plan, November 2018	Policy EI 8 requires the demonstration that wind farms would not have a significant adverse effect from noise.
Outer Hebrides Local Development plan, Supplementary Guidance: Wind Farm Development, November 2018 (SPG)	Provides criteria diverging from ETSU-R-97 "given the low levels of background noise" for both development proposals in isolation and cumulative effects of other wind farms. The guidance states the Comhairle also requires details on the extent of construction works, length of works, proposed times, proximity to residences and a consideration of whether assessment is required with reference to BS 5228-1: 2009+A1:2014 '*Code of practice for noise and vibration control on construction and open sites. Noise*'.
ETSU-R-97, '***The Assessment and Rating of Noise from Wind Farms***', The Working Group on Noise from Wind Turbines (ETSU-R-97, 1996)	Presents information and advice to developers and planners on the environmental assessment of noise from wind turbines. The guidance offers a framework for the measurement of wind farm noise and gives indicative noise levels thought to offer a reasonable degree of protection to wind farm neighbours.
The Institute of Acoustics (IoA) '***A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise***' (GPG, 2013)	Presents current good practice in the application of ETSU-R-97 for all wind turbine developments above 50kW. The GPG gives information to assist consultants, developers and local planning authorities in using the correct technical and procedural methods for the assessment and determination of wind farm applications, reflecting the original principles within ETSU-R-97 and the results of research carried out and experience gained since its publication.
British standard (BS) 5228-1&-2:2009+A1:2014 '***Code of practice for Noise and Vibration on Construction and Open Sites.***	Includes guidelines over the acceptability of noise and vibration from construction sites and methodology to predict construction noise and vibration.
Calculation of Road Traffic Noise (CRTN, Welsh Office, 1988)	Provides a calculation methodology for predicting road noise.
Design manual For Roads and Bridges (DMRB, Highways Agency, 2011)	Provides assessment criteria for changes in road noise including temporary impacts from construction traffic.

12.4 Data Gathering Methodology

Study Area

12.4.1 The assessment of wind farm noise primarily concerns the potential for annoyance and as such the study area is limited to residential receptors that are closest to the Proposed Development in different directions from the Development Site.

12.4.2 Under the ETSU-R-97 screening method, a residence has to be within an area initially predicted to exceed 35dB $L_{A90,10min}$ in wind speeds up to 10 ms^{-1} to be considered for assessment. The significance of effect, discussed in **Section 12.9**, is based upon the worst-case result on any individual residential receptor in any direction from the Development Site[1].

Desk Study

12.4.3 The information within this EIA Report chapter is largely based upon data used within the 2011 ES, the exception being data for the reference wind turbine. The wind turbine manufacturer Vestas has

[1] As noise reduces with distance from the source, the magnitude of change with respect to any residences further away from the Proposed Development than those assessed would be reduced.

provided relevant sound level data for the two candidate wind turbines under consideration , with turbines for the cumulative assessment taken from publicly available datasheets for each turbine type involved.

Survey Work

12.4.4 The data sources most relevant to the assessment of noise from the Proposed Development are those detailed within the 2011 ES.

12.4.5 As stated in the scoping request (**Appendix 2A**) and subsequently agreed with the local Environmental Health Officer, it has been assumed that the prevailing baseline noise conditions have not changed significantly from those presented within the 2011 ES. On this basis, the results of background noise monitoring presented in the 2011 ES remain applicable for this EIA Report; and as baseline noise levels normally increase over time, the use of this data to represent residential receptors is considered a conservative approach.

12.4.6 Background noise monitoring was undertaken at four locations representing the closest residential receptors to the Consented Development in March and April 2011. The local area has been reviewed in 2019 and it is considered that these locations still represent the noise environment of the closest residences to the Proposed Development. The positions of monitoring locations are shown in **Figure 12.1** and are listed in **Table 12.2**. Complete details of the monitoring methodology is presented in **Appendix 12A.**

12.4.7 Noise levels at these locations are deemed representative of the nearest sensitive receptors to the Development Site. Each monitoring location was discussed and agreed with a relevant representative of the CnES prior to noise monitoring taking place.

Table 12.2 Noise Monitoring Locations

Ref	Location	Easting	Northing	Monitoring Position
M1	Gleann Ur	140770	934540	At location M1 the sound level meter (SLM) was placed to the south east of the main house overlooking empty fields to the south. The SLM was in a free-field position, approximately 7m from the nearest façade at the garden boundary, on the side of the house deemed quietest as it was away from the existing trees along the western and north western boundaries. The SLM was placed in a section of the garden that had a non-close boarded fence approximately 3m to the west of the SLM. Due to the construction of the fence and relatively large gaps between panels, its noise reflective properties are considered small, thus having a negligible impact upon the measured background noise levels. No audible wind noise was noted through the gaps in the fence. The noise environment noted during each of the visits was quiet, with low levels of traffic movements as it is a cul-de-sac. The dominant noise source noted during kit setup and retrieval was from noise through trees on the opposite side of the property, distant road traffic movements and occasional livestock noise from the adjacent field.
M2	Cnoc Mairi	140610	934010	The SLM at location M2 was placed along the western boundary of the property, on the side facing the Proposed Development. The SLM was placed in a free-field position at the furthest point from the main house and secured to the boundary fence. The dominant noise source noted during kit setup and retrieval was from road traffic along the adjacent A858. Additional noise sources included gulls and wind noise.
M3	Creed Bridge	140419	932685	The SLM at location M3 was placed along the north western boundary of the property at Creed Bridge. The SLM was placed in a free-field position on the quietest side of the property away from A859. At this location the noise environment was noted during kit setup and retrieval to be dominated by road traffic noise along the A859, and industrial noise from the nearby Marybank Quarry.

Ref	Location	Easting	Northing	Monitoring Position
M4	Druim Dubh	138360	930520	The SLM at M4 was placed in the garden area, north of the property. The SLM was placed at one of the furthest locations from the house in a free-field position, approximately 5m from the main building. The property was surrounded on each side by thick foliage and trees, which influenced the background noise levels during periods of increased wind speed. Therefore the noise levels collected by the SLM placed near to the trees to the north of the property are deemed representative of those at each side of the house. The dominant noise source noted at this location during kit setup and retrieval was from road traffic passing at high speeds along the adjacent A859.

12.5 Overall Baseline

Current Baseline

12.5.1 The Development Site is located in a semi-rural area with the main sources of noise being from road traffic on the A858 and A859. Other notable sources of noise affecting the noise environment at nearby residences include the Marybank Quarry and smaller commercial ventures.

Future Baseline

12.5.2 Given the semi-rural nature of the Development Site, it is reasonable to assume that, over time, background noise levels in the vicinity would generally remain similar, with possible slight increases in road traffic noise in line with forecast traffic growth.

12.6 Consultation

12.6.1 **Table 12.3** provides a summary of the issues specific to noise relating to the Proposed Development that have been raised by Consultees, and the responses given.

Table 12.3 Summary of Issues Raised Regarding Noise during Consultation

Issue raised	Consultee(s)	Response and how considered in this Chapter
The main previous consent of 11/00333/CONSG – Environmental Health note condition 47 refers to night hours 43 dB and quiet waking hours of 35dB. It is not clear if this has been superseded in subsequent amendments. The current levels applied to new applications are 38dB night and 35dB daytime, rather than quiet waking hours.	The Comhairle Environmental Health (CEH) – Scoping Report responses	The criteria have been updated taking into account changed guidance levels **(Section 12.9).**
Require details on the extent of construction works, taking account of the length of construction period, proposed times, details of any borrow pit blasting and proximity to existing noise receptors. Proposals should take account of BS 5228:2009+A1:2014 Parts 1 and 2. Where it is believed that construction noise would be significant then a site specific noise impact assessment would be required	The CEH – Scoping Report responses	Construction noise and vibration is discussed in the Scoping section of this EIA Report Chapter (**Section 12.7**). Details of borrow pit blasting are not available at this time but would be appropriately mitigated via a Blasting Management Plan.
Request by Wood E&IS to utilise previous background noise survey	The CEH – Direct consultation	Use of previous baseline data was agreed with the CEH providing this took account of changes to noise criteria.

12.7 Scope of the Assessment

Construction

12.7.1 A detailed method statement for the construction of the Proposed Development would be produced in partnership between the developer and the appointed construction contractors. The details of this would not be known until after the determination of the application, therefore the consideration of construction noise is based upon the 2011 ES assessment (which itself was based on an assumed scenario given details would only be confirmed following appointment of construction contractor).

12.7.2 Construction traffic data has been updated as detailed in **Chapter 13: Traffic and Transport** and noise related to construction traffic movements to and from the Development Site is assessed accordingly.

12.7.3 Information of blasting of borrow pits would not be known until the detailed design phase and therefore it is not possible to provide a quantitative assessment. However, given the distance of the nearest borrow pit to a receptor (R7 Druim Dubh) is 850m, it is considered that blasting can be sufficiently managed by good practice to avoid significant effects. A Blasting Management Plan would be designed to incorporate good practice and to minimise noise and vibration effects such that they would be not significant. No further assessment of blasting is therefore considered within this chapter. However, relevant mitigation for blasting of borrow pits is referred to in **Section 12.8**.

12.7.4 Due to the separation distances between the Development Site and residential properties, the potential for vibration impacts during construction (other than from blasting discussed above) of the Proposed Development have been scoped out.

Operation

12.7.5 Operational traffic to maintain the turbines would be minimal and not a significant noise source and has therefore been scoped out of further assessment.

12.7.6 The scope therefore consists of the assessment of noise from the operation of the wind turbines.

Decommissioning

12.7.7 It is assumed that decommissioning noise would be generally less than (as below ground infrastructure such as turbine bases will be left in situ) or, at most, similar to that experienced during the construction period (the decommissioning period will also be lesser in duration). Noise from decommissioning has therefore been scoped out of further assessment.

Spatial Scope

12.7.8 The spatial scope is the same as that within the 2011 ES and that described within **Section 12.4.1**: Study Area.

Temporal Scope

12.7.9 The temporal scope of the assessment of noise is consistent with the period over which the development would be carried out and therefore covers the construction (approximately 30 months) and operational periods (25 years).

Potential Receptors

12.7.10 The closest noise sensitive receptors to the Proposed Development are residences identified in **Figure 12.1** and listed in **Table 12.4** below and are the same as in the 2011 ES. The noise monitoring locations deemed representative of each receptor are also noted. These are the same as in the 2011 ES.

Table 12.4 Noise Receptors

Receptor Name	Easting	Northing	Representative Background Noise Measurement Location
R1 - Gleann Ur North	140930	934980	M1
R2 - Cnoc Uilleam Chubair	141070	935580	M1
R3 - Gleann Ur	140750	934530	M1
R4 - Bennadrove Road	140560	934280	M2
R5 - Cnoc Mairi	140440	933960	M2
R6 - Creed Bridge	140417	932666	M3
R7 - Druim Dubh	138330	930520	M4
R8 - Macaulay Farm	140120	932150	M3

12.7.11 Residential receptors are all considered of high sensitivity to noise with the potential for being significantly affected by noise from the operation of the Proposed Development. No commercial or leisure receptors are considered at risk of significant effects from the Proposed Development.

12.7.12 Ecological receptors normally become accustomed to changes in noise level over time. Given the steady source of turbine noise at low levels relative to other noise sources in the environment (such as road traffic noise) it is not considered that their operation would have a significant effect on ecological species in the area. The effect of construction noise on ecological receptors is considered in **Chapter 8: Ornithology** and **Chapter 9: Ecology**.

12.8 Environmental Measures Embedded into the Development Proposals

12.8.1 To minimise disturbance, the construction process would have regard to general guidance for controlling construction noise that is given in British Standard BS 5228-1:2009+A1:2014 '*Noise and Vibration on Construction and Open Sites. Part 1: Noise*'.

12.8.2 Blasting for the borrow pits would be managed with a Blasting Management Plan. Part of this plan would be to minimise noise, air overpressure and groundborne vibration.

12.8.3 A wind farm noise assessment is part of an iterative design process, the aim of which is to achieve a design from which noise emissions meet limits derived following the approach given in ETSU-R-97 and/or relevant local guidelines. Consequently, the design of the scheme is such that necessary operational noise limits are met and no further environmental mitigation measures are required.

12.9 Assessment Methodology

Site Construction Noise

12.9.1 As no changes are anticipated to the general construction methodology assessed in the 2011 ES, the methodology for assessment remains the same and is described in **Appendix 12A.** In summary, the method requires the prediction of noise from an assumed construction list at sensitive noise receptors and comparison with BS 5228 thresholds of significance. Whilst BS 5228-1 has been updated since the 2011 ES, changes would not have an effect on the results of the outcome of the construction noise assessment presented in the 2011 ES.

Construction Traffic

12.9.1 Construction traffic noise has been assessed by comparing baseline traffic along the A859 to the temporary increase as a result of additional construction generated HGVs, predicted using CRTN methodology. The calculations provide a basic noise level (BNL) from road traffic 10m from the roadside. As the definition of impact relates to an increase in noise, this position suitably represents any receptor (i.e. the absolute noise, which would change with distance from the road and differing between the receptors, is not relevant). The traffic noise assessment considers two options of construction approach; either all aggregate is sourced off the Development Site (worst case) or sourced from borrow pits within it (preferred choice of the Applicant).

Operation

12.9.2 The prediction and assessment of noise within this chapter adheres to ETSU-R-97 '*The Assessment and Rating of Noise from Windfarms*' and guidance within '*A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise*' (GPG, 2013). Prediction of noise has been completed using CadnaA computer noise modelling software incorporating prediction methodology within ISO 9613-2: 1996 '*Acoustics – Attenuation of sound during propagation outdoors – Part 2: General Method of Calculation*'. Details of the noise modelling method are presented in **Appendix 12A**.

Turbine Data

12.9.3 A range of turbine models would be appropriate for the Proposed Development. The final selection of turbine would follow a competitive tendering process and thus the actual model of turbine may differ from those on which this assessment has been based. However, the final choice of turbine would be required to comply with the noise criterion levels which have been established within this noise assessment and therefore effects would be no worse than assessed.

12.9.4 Reference turbines currently being considered for the Proposed Development are the Vestas V136 (88m hub and 156m tip height) and V150 (105m hub and 180m tip height) turbines. Data taken from the various turbine datasheets have been used to represent turbine sound power levels associated with both the Proposed Development and other built and planned wind farms in the surrounding area for the cumulative assessment.

12.9.5 The data used to represent the sound power levels for the turbines is presented in **Table 12.5**. Spectrum data for each wind turbine is presented in **Appendix 12A.**

Table 12.5 Wind Turbine Data

Wind Farm Site	Wind Turbine	Sound power levels (dB L_{WA}) by wind speed (mph)								
		4	5	6	7	8	9	10	11	12
Stornoway	Vestas V136	93.6	96.4	99.9	103.1	105.9	106.9	106.9	*106.9**	*106.9**
	Vestas V150	94.0	97.1	100.5	103.8	106.6	108.0	108.0	108.0	108.0
Arnish Moor	Nordex N60	100.5	101.5	102.5	103.5	104.7	106.0	107.5	109.0	110.5
Creed	Enercon E33	92.0	92.0	102.0	104.9	100.8	101.0	101.0	101.0	101.0
Beinn Ghrideag / Pentland Road	Enercon E82	100.5	100.5	104.5	107.5	108.5	108.5	108.5	108.5	108.5
Bridge Cottages Newmarket	WES 18/80	*90.0**	*91.0**	*92.0**	93.0	93.7	94.4	95.2	95.9	96.6

**Conservative estimation based on WOOD experience of similar turbine data.*

12.9.6 The data within **Table 12.5** includes uncertainty and tonal penalties where this is specified within the manufacturer's datasheet. The Vestas turbines and Nordex N60 have a 2dB uncertainty correction added to data provided from manufacturer sheets as it was unclear if the sound power levels were guaranteed or included any correction for standard deviation of measurement and uncertainty (i.e. 2dB was added on top of the above values). The datasheet for the Enercon E82 E3 turbines states a 1dB uncertainty included within the data and a 1.5dB tonal penalty, which is included in **Table 12.5**. The Enercon E33 was stated to require a 1dB uncertainty correction for all wind speeds and 5dB penalty on the 6 and 7m/s wind speed sound power levels, while the WES 18/80 stated a requirement for 1.5dB to be added across wind speeds (all corrections are included in **Table 12.5**).

12.9.7 **Table 12.6** presents the wind farms and turbines considered within the cumulative assessment.

Table 12.6 Wind Farms Included in Cumulative Assessment

Name	Distance from Stornoway (km)	Turbine Type	Number of turbines	Hub height (m)	Tip Height (m)
Beinn Ghrideag	0.5	Enercon E82 E3	3	80	125
Pentland Road	1.6	Enercon E82 E3	6	80	121
Arnish Moor	1.6	Nordex N60	3	46	76
Creed	1.1	Enercon E33	1	40	61
Bridge Cottages Newmarket	2.7	WES 18/80	1	31	39

Noise Limits

12.9.8 The ETSU-R-97 Guidance recommends that wind farm noise limits should be set relative to existing background noise levels, subject to a fixed minimum limit, and that these limits should reflect the variation in background noise with wind speed. The wind speeds that should be considered range from the cut-in speed (typically 4ms^{-1}) up to 12ms^{-1}, the point at which wind turbines are usually at or above 95% of their rated power and thus no significant increases in noise emissions are expected. Wind speeds are referenced to a 10m measurement height (V10) on the Development Site.

12.9.9 In ETSU-R-97, the daytime noise limit is derived from background noise data measured at residential properties during the 'quiet daytime', as defined in ETSU-R-97, which comprises:

- Weekday evenings from 18:00 - 23:00;
- Saturday afternoons from 13:00 - 23:00; and
- All day Sunday 07:00 - 23:00.

12.9.10 It is noted that the Comhairle SPG states a requirement to assess noise against daytime hours of 07:00 to 23:00. This is considered further in **Section 12.9.15**

12.9.11 The noise measurements are plotted against the concurrent wind speed data measured at the Development Site and a 'best fit' correlation is established.

12.9.12 In low noise environments (i.e. where background noise levels are less than 30-35dB(A)), the ETSU-R-97 Guidance recommends that wind farm noise for quiet daytime periods should be limited to a lower fixed level within the range 35-40dB $L_{A90,10min}$ or 5 dB(A) above the prevailing background, whichever is the greater. The choice of which lower fixed level to use within the range is based upon a number of factors as outlined in Paragraph 22 of the ETSU-R-97 Guidance. These include:

- The number of dwellings in the neighbourhood of the wind farm;
- The effect of noise limits on the amount of electricity generated; and
- The duration and level of exposure.

12.9.13 A conservative approach as required by the Comhairle SPG has been taken using the lower fixed daytime noise limit for the Proposed Development of 35dB $L_{A90,\ 10mins}$ (or 5dB above prevailing background, whichever is greater). This is considered worst-case as a higher lower limit could be identified which would reflect both the scale of the Proposed Development in terms of power (kWh) generated and the area of the Development Site.

12.9.14 The night-time noise limit is derived from the background noise data measured during the night-time period (23:00 to 07:00) every day. As with the daytime data, this is plotted against the concurrent wind speed data and a 'best fit' correlation established. For night time periods, the ETSU-R-97 recommended limits are 43dB $L_{A90,10min}$ or 5 dB(A) above prevailing background, whichever is the greater. However, the Comhairle SPG requires a lower fixed limit for night-time of 38 dB $L_{A90,10min}$ which has been used for this assessment (or 5 dB(A) above prevailing background, whichever is the greater).

12.9.15 The cumulative assessment utilises the following limits in accordance with the Comhairle SPG:

- During daytime hours (07:00-23:00), 38dB $L_{A90,\ 10min}$ or the daytime hours $L_{A90,\ 10min}$ background noise level plus 5dB(A), whichever is the greater;
- During night-time hours (between 23:00-07:00), 40dB $L_{A90,\ 10min}$, or the night-time hours $L_{A90,\ 10min}$ background noise level plus 5dB(A), whichever is the greater.

12.9.16 The only exception to the daytime and night-time limits outlined above is for properties with a financial involvement in the Proposed Development, where limits can be increased to 45dB(A). The owner of R7, Druim Dubh, is financially involved in the Stornoway scheme and the higher lower-fixed noise limits have been applied for this location.

12.9.17 The ETSU-R-97 noise criteria assume that the wind turbine noise contains no audible tones. Where tones are present, a correction is added to the measured or predicted noise level before comparison with the recommended limits. The level of correction would depend on how audible the tone is. A warranty would be sought from the manufacturer of the turbine selected for the Proposed Development such that the noise output would either not require a tonal correction (under the ETSU-R-97 Guidance) or, where tonal corrections are required, the noise criteria would be met having made the appropriate correction for any tonal component.

12.9.18 The ETSU-R-97 Guidance states that the $L_{A90,\ 10min}$ descriptor should be used for both the background noise and wind farm noise when setting limits.

Significance of Effect

12.9.19 The generic project-wide approach to the assessment methodology is set out in **Chapter 2:**, and specifically in **Sections 2.5** to **2.7**. However, whilst this has informed the approach that has been used in this noise assessment, it is necessary to set out how this methodology has been applied, and adapted as appropriate, to address the specific needs of this noise assessment.

12.9.20 The assessment of significant construction and operational noise effects is based upon compliance with the BS 5228:2009+A1:2014 and ETSU-R-97 limits respectively, i.e. a breach of the noise limits indicates a 'significant' effect, whereas compliance with noise limits indicates a 'not significant' effect. It is acknowledged that the BS 5228:2009+A1:2014 and ETSU-R-97 approach do not directly aim to determine significance in an EIA context, rather it represents a balance between the need for development and the need to protect residential amenity. Since the purpose of identifying significant effects during EIA is to ensure they are taken into account in the 'planning balance', for the purposes of this assessment it is assumed that noise effects up to the noise limits have already been taken into account and thus only noise levels exceeding the BS 5228:2009+A1:2014 and ETSU-R-97 noise limits are deemed to be 'significant' and require further consideration.

12.9.21 The magnitude of impact from increases in traffic noise from construction is based on criteria within the Design Manual for Roads and Bridges (DMRB) and is presented in **Table 12.7.** As the sensitivity is the same for all receptors, the magnitude of impact directly relates to significance of effect. A significant effect is considered a magnitude of 3 dB or more change in traffic noise level.

Table 12.7 Construction Traffic Criteria

Noise Level Change $L_{A10,\ 18\ hr}$	Magnitude of Impact	Significance
0	No Change	Not Significant
0.1 – 0.9	Negligible	
1.0 – 2.9	Minor	
3 – 4.9	Moderate	Significant
5+	Major	

12.10 Assessment of Noise Effects

Site Construction Noise

12.10.1 The predictions undertaken for the 2011 ES show that construction noise at residential receptors would not exceed the lower threshold for significant effect within BS 5228 of 65 dB(A) for normal daytime hours, being:

- Monday to Friday 07:00 – 19:00;
- Saturday 07:00 – 14:00.

12.10.2 The full results of the assessment are presented in **Appendix 12A**.

12.10.3 The Proposed Development is farther from residences than in the 2011 ES[2], and effects would at worst be similar to that previously concluded or potentially of a lesser magnitude. Therefore, the effect of site construction noise would be not significant.

Construction Traffic

12.10.4 **Table 12.8** presents the traffic data assuming the two scenarios of all aggregate being sourced from on-site borrow pits or off-site and results of the construction traffic noise assessment.

Table 12.8 Construction Traffic Criteria

Aggregate Source	2021 Baseline Traffic		2021 Baseline + Construction Traffic		LA10, 18 hour (dB)		Difference (dB)
	HGV%	Total	HGV%	Total	Baseline	Baseline + Construction	
Off-Site	2.9	2,959	9.9	3,187	62.1	64.3	2.2
On-Site Borrow Pits	2.9	2,959	5.7	3,047	62.1	63.1	1.0

12.10.5 The results show that there would be minor magnitude impact as a result of either construction option, the effect of which would be not significant.

Operation

Baseline Conditions

12.10.6 The baseline conditions for the purposes of assessing operational noise effects are based upon those within the 2011 ES. However, it is noted that a variation of hub height and different time periods for daytime (instead of quiet amenity time) have an effect on baseline consideration[3].

[2] In the Consented Development, the closest property was approximately 780m, the Proposed Development is approximately 1.8km from the nearest turbine.

[3] To correlate measured background noise to a wind speed as per the latest IOA guidance, the hub height wind speed at the time of measurement is calculated and then this is standardised to 10 m wind speed. This allows for a comparison with the sound power level of a wind turbine which is normally provided as relating to wind speeds at 10 metre height. Therefore, the height of the wind turbine hub will potentially change the calculated background noise level at a wind speed.

12.10.7 An assessment of how such considerations change the baseline values has been analysed in **Appendix 12A.** The results of this analysis show that the inclusion of a wider daytime period results in a higher daytime limit (likely the result of traffic noise on the local road system). Night-time differences between the approaches are not significant (0.1 dB). Therefore, the values for baseline in the 2011 ES have been used as this is the most conservative approach.

Predicted Effects and Their Significance

12.10.8 Noise levels have been predicted for the closest residential properties to the Proposed Development, as listed in **Table 12.4**. **Table 12.9** and **Table 12.10** which present the following information for each wind speed for each of the eight residences for daytime and night-time periods respectively:

- Values of the background noise curve at the integer wind speeds, measured and adjusted for wind shear[4];
- The noise limits derived from the background noise curve, in accordance with the ETSU-R-97, the IoA GPG and as amended by the Comhairle SPG;
- The predicted turbine noise levels from the Proposed Development, based on worst-case downwind noise propagation and assuming turbines are operating simultaneously; and
- The margin by which the predicted turbine noise meets or exceeds the noise limits at each wind speed using the worst-case downwind noise predictions (negative values indicate the predicted noise levels are lower than the noise limits).

Table 12.9 Stornoway Only Noise Assessment - Daytime

Noise Parameter, $L_{A90,\ 10\ mins}$, dB	**Standardised 10m Wind Speed quoted by Manufacturer (ms^{-1})**								
	4	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
R1 – Gleann Ur North									
Background Noise Curve	32.8	33.7	34.8	36.1	37.6	39.3	41.2	43.3	45.7
Derived Noise Limit	37.8	38.7	39.8	41.1	42.6	44.3	46.2	48.3	50.7
Wind Farm Turbine Noise	25.8	28.2	31.9	31.6	30.6	30.6	30.6	30.6	30.6
Margin Under Noise Limit	-12.0	-10.5	-7.9	-9.5	-12.0	-13.7	-15.6	-17.7	-20.1
R2 – Cnoc Uilleam Chubair									
Background Noise Curve	32.8	33.7	34.8	36.1	37.6	39.3	41.2	43.3	45.7
Derived Noise Limit	37.8	38.7	39.8	41.1	42.6	44.3	46.2	48.3	50.7
Wind Farm Turbine Noise	26.7	29.1	32.8	32.5	31.5	31.5	31.5	31.5	31.5
Margin Under Noise Limit	-11.1	-9.6	-7.0	-8.6	-11.1	-12.8	-14.7	-16.8	-19.2
R3 – Gleann Ur									

[4] The increase of wind speed with height above ground. Within the IOA guidance measured background and turbine sound power levels are related to a wind speed at a height of 10 metres above ground. Therefore, an adjustment to the measured wind speed during the noise survey (normally substantially higher than 10 metres) has to be corrected to 10 metres taking into account wind shear.

Noise Parameter, $L_{A90,\ 10\ mins}$, dB	Standardised 10m Wind Speed quoted by Manufacturer (ms^{-1})								
	4	5	6	7	8	9	10	11	12
Background Noise Curve	32.8	33.7	34.8	36.1	37.6	39.3	41.2	43.3	45.7
Derived Noise Limit	37.8	38.7	39.8	41.1	42.6	44.3	46.2	48.3	50.7
Wind Farm Turbine Noise	28.0	30.3	34.1	33.8	32.8	32.8	32.8	32.8	32.8
Margin Under Noise Limit	-9.8	-8.4	-5.7	-7.3	-9.8	-11.5	-13.4	-15.5	-17.9
R4 – Bennadrove Road									
Background Noise Curve	29.2	30.3	31.5	32.8	34.1	35.4	36.8	38.3	39.8
Derived Noise Limit	35.0	35.3	36.5	37.8	39.1	40.4	41.8	43.3	44.8
Wind Farm Turbine Noise	28.1	30.5	34.2	33.9	33.0	33.0	33.0	32.9	32.9
Margin Under Noise Limit	-6.9	-4.8	-2.3	-3.9	-6.1	-7.4	-8.8	-10.4	-11.9
R5 – Cnoc Mairi									
Background Noise Curve	29.2	30.3	31.5	32.8	34.1	35.4	36.8	38.3	39.8
Derived Noise Limit	35.0	35.3	36.5	37.8	39.1	40.4	41.8	43.3	44.8
Wind Farm Turbine Noise	29.6	32.0	35.7	35.4	34.5	34.5	34.5	34.5	34.5
Margin Under Noise Limit	-5.4	-3.3	-0.8	-2.4	-4.6	-5.9	-7.3	-8.8	-10.3
R6 – Creed Bridge									
Background Noise Curve	33.4	34.2	35.0	36.1	37.3	38.6	40.0	41.7	43.4
Derived Noise Limit	38.4	39.2	40.0	41.1	42.3	43.6	45.0	46.7	48.4
Wind Farm Turbine Noise	28.8	31.2	34.9	34.6	33.6	33.6	33.6	33.6	33.6
Margin Under Noise Limit	-9.6	-8.0	-5.1	-6.5	-8.7	-10.0	-11.4	-13.1	-14.8
R7 – Druim Dubh									
Background Noise Curve	28.1	30.4	32.7	35.1	37.4	39.4	42.2	44.7	47.1
Noise Limit (financially involved property)	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0
Wind Farm Turbine Noise	33.2	35.9	39.6	39.3	38.3	38.3	38.3	38.3	38.3
Margin Under Noise Limit	-11.8	-9.1	-5.4	-5.7	-6.7	-6.7	-6.7	-6.7	-6.7
R8 – Macaulay Farm									
Background Noise Curve	34.4	34.7	35.2	35.9	36.9	38.2	39.6	41.3	43.3
Derived Noise Limit	39.4	39.7	40.2	40.9	41.9	43.2	44.6	46.3	48.3
Wind Farm Turbine Noise	29.3	31.8	35.5	35.2	34.1	34.2	34.1	34.1	34.1
Margin Under Noise Limit	-10.1	-7.9	-4.7	-5.7	-7.8	-9.0	-10.5	-12.2	-14.2

Table 12.10 Stornoway Only Noise Assessment – Night-time

Noise Parameter, $L_{A90, 10 mins}$, dB	Standardised 10m Wind Speed quoted by Manufacturer (ms^{-1}) 4	5	6	7	8	9	10	11	12
R1 – Gleann Ur North									
Background Noise Curve	27.6	27.9	28.4	29.4	30.7	32.3	34.4	36.7	39.5
Derived Noise Limit	38.0	38.0	38.0	38.0	38.0	38.0	39.4	41.7	44.5
Wind Farm Turbine Noise	25.8	28.2	31.9	31.6	30.6	30.6	30.6	30.6	30.6
Margin Under Noise Limit	-12.2	-9.8	-6.1	-6.4	-7.4	-7.4	-8.8	-11.1	-13.9
R2 – Cnoc Uilleam Chubair									
Background Noise Curve	27.6	27.9	28.4	29.4	30.7	32.3	34.4	36.7	39.5
Derived Noise Limit	38.0	38.0	38.0	38.0	38.0	38.0	39.4	41.7	44.5
Wind Farm Turbine Noise	26.7	29.1	32.8	32.5	31.5	31.5	31.5	31.5	31.5
Margin Under Noise Limit	-11.3	-8.9	-5.2	-5.5	-6.5	-6.5	-7.9	-10.2	-13.0
R3 – Gleann Ur									
Background Noise Curve	27.6	27.9	28.4	29.4	30.7	32.3	34.4	36.7	39.5
Derived Noise Limit	38.0	38.0	38.0	38.0	38.0	38.0	39.4	41.7	44.5
Wind Farm Turbine Noise	28.0	30.3	34.1	33.8	32.8	32.8	32.8	32.8	32.8
Margin Under Noise Limit	-10.0	-7.7	-3.9	-4.2	-5.2	-5.2	-6.6	-8.9	-11.7
R4 – Bennadrove Road									
Background Noise Curve	23.1	24.0	25.0	26.3	27.7	29.3	31.1	33.1	35.3
Derived Noise Limit	38.0	38.0	38.0	38.0	38.0	38.0	38.0	38.1	40.3
Wind Farm Turbine Noise	28.1	30.5	34.2	33.9	33.0	33.0	33.0	32.9	32.9
Margin Under Noise Limit	-9.9	-7.5	-3.8	-4.1	-5.0	-5.0	-5.0	-5.2	-7.4
R5 – Cnoc Mairi									
Background Noise Curve	23.1	24.0	25.0	26.3	27.7	29.3	31.1	33.1	35.3
Derived Noise Limit	38.0	38.0	38.0	38.0	38.0	38.0	38.0	38.1	40.3
Wind Farm Turbine Noise	29.6	32.0	35.7	35.4	34.5	34.5	34.5	34.5	34.5
Margin Under Noise Limit	-8.4	-6.0	-2.3	-2.6	-3.5	-3.5	-3.5	-3.6	-5.8
R6 – Creed Bridge									
Background Noise Curve	26.8	27.9	29.0	30.3	31.7	33.3	34.9	36.7	38.6
Derived Noise Limit	38.0	38.0	38.0	38.0	38.0	38.3	39.9	41.7	43.6

Noise Parameter, $L_{A90, 10 mins}$, dB	Standardised 10m Wind Speed quoted by Manufacturer (ms^{-1})								
	4	5	6	7	8	9	10	11	12
Wind Farm Turbine Noise	28.8	31.2	34.9	34.6	33.6	33.6	33.6	33.6	33.6
Margin Under Noise Limit	-9.2	-6.8	-3.1	-3.4	-4.4	-4.7	-6.3	-8.1	-10.0
R7 – Druim Dubh									
Background Noise Curve	20.4	22.7	25.1	27.6	30.2	32.9	35.8	38.7	41.8
Noise Limit (financially involved property)	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0
Wind Farm Turbine Noise	33.2	35.9	39.6	39.3	38.3	38.3	38.3	38.3	38.3
Margin Under Noise Limit	-11.8	-9.1	-5.4	-5.7	-6.7	-6.7	-6.7	-6.7	-6.7
R8 – Macaulay Farm									
Background Noise Curve	27.0	28.1	29.3	30.5	31.9	33.5	35.1	36.8	38.7
Derived Noise Limit	38.0	38.0	38.0	38.0	38.0	38.5	40.1	41.8	43.7
Wind Farm Turbine Noise	29.3	31.8	35.5	35.2	34.1	34.2	34.1	34.1	34.1
Margin Under Noise Limit	-8.7	-6.2	-2.5	-2.8	-3.9	-4.3	-6.0	-7.7	-9.6

12.10.9 The results show no exceedances of the ETSU-R-97 limits and therefore the operational noise effect from the Proposed Development in isolation would be not significant.

12.11 Assessment of Cumulative Effects

12.11.1 As outlined in **Section 2.8 in Chapter 2**, consideration has been given as to whether any of the noise receptors that have been taken forward for assessment in this chapter are likely to be subject to cumulative effects because of noise generated by other developments. Other developments are already constructed and therefore this assessment considers operational cumulative effects as a result of the Proposed Development and those detailed in **Table 12.6**

12.11.2 **Table 12.11** and **Table 12.12** present the information summarised in the modelling approach for all wind farms contributing to the noise levels at the identified receptors.

Table 12.11 Cumulative Noise Assessment - Daytime

Noise Parameter, $L_{A90, 10 mins}$, dB	Standardised 10m Wind Speed quoted by Manufacturer (ms^{-1})								
	4	5	6	7	8	9	10	11	12
R1 – Gleann Ur North									
Background Noise Curve	32.8	33.7	34.8	36.1	37.6	39.3	41.2	43.3	45.7
Derived Noise Limit	38.0	38.7	39.8	41.1	42.6	44.3	46.2	48.3	50.7
Wind Farm Turbine Noise	26.2	28.5	32.1	31.9	31.1	31.2	31.3	31.4	31.6

Noise Parameter, $L_{A90,\ 10\ mins}$, dB	Standardised 10m Wind Speed quoted by Manufacturer (ms^{-1})								
	4	5	6	7	8	9	10	11	12
Margin Under Noise Limit	-11.8	-10.2	-7.7	-9.2	-11.5	-13.1	-14.9	-16.9	-19.1
R2 – Cnoc Uilleam Chubair									
Background Noise Curve	32.8	33.7	34.8	36.1	37.6	39.3	41.2	43.3	45.7
Derived Noise Limit	38.0	38.7	39.8	41.1	42.6	44.3	46.2	48.3	50.7
Wind Farm Turbine Noise	27.0	29.3	33.0	32.7	31.9	31.9	32.0	32.0	32.1
Margin Under Noise Limit	-11.0	-9.4	-6.8	-8.4	-10.7	-12.4	-14.2	-16.3	-18.6
R3 – Gleann Ur									
Background Noise Curve	32.8	33.7	34.8	36.1	37.6	39.3	41.2	43.3	45.7
Derived Noise Limit	38.0	38.7	39.8	41.1	42.6	44.3	46.2	48.3	50.7
Wind Farm Turbine Noise	28.3	30.6	34.2	34.0	33.2	33.3	33.4	33.5	33.6
Margin Under Noise Limit	-9.7	-8.1	-5.6	-7.1	-9.4	-11.0	-12.8	-14.8	-17.1
R4 – Bennadrove Road									
Background Noise Curve	29.2	30.3	31.5	32.8	34.1	35.4	36.8	38.3	39.8
Derived Noise Limit	38.0	38.0	38.0	38.0	39.1	40.4	41.8	43.3	44.8
Wind Farm Turbine Noise	28.4	30.7	34.4	34.2	33.4	33.4	33.5	33.6	33.8
Margin Under Noise Limit	-9.6	-7.3	-3.6	-3.8	-5.7	-7.0	-8.3	-9.7	-11.0
R5 – Cnoc Mairi									
Background Noise Curve	29.2	30.3	31.5	32.8	34.1	35.4	36.8	38.3	39.8
Derived Noise Limit	38.0	38.0	38.0	38.0	39.1	40.4	41.8	43.3	44.8
Wind Farm Turbine Noise	29.9	32.2	35.9	35.7	34.9	34.9	35.0	35.1	35.3
Margin Under Noise Limit	-8.1	-5.8	-2.1	-2.3	-4.2	-5.5	-6.8	-8.2	-9.5
R6 – Creed Bridge									
Background Noise Curve	33.4	34.2	35.0	36.1	37.3	38.6	40.0	41.7	43.4
Derived Noise Limit	38.4	39.2	40.0	41.1	42.3	43.6	45.0	46.7	48.4
Wind Farm Turbine Noise	29.4	31.7	35.3	35.2	34.4	34.5	34.7	34.9	35.3
Margin Under Noise Limit	-9.0	-7.5	-4.7	-5.9	-7.9	-9.1	-10.3	-11.8	-13.1
R7 – Druim Dubh									
Background Noise Curve	28.1	30.4	32.7	35.1	37.4	39.4	42.2	44.7	47.1
Noise Limit (financially involved property)	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0

Noise Parameter, $L_{A90,\ 10\ mins}$, dB	Standardised 10m Wind Speed quoted by Manufacturer (ms^{-1})								
	4	5	6	7	8	9	10	11	12
Wind Farm Turbine Noise	35.3	37.4	40.5	40.5	40.2	40.6	41.3	42.0	42.9
Margin Under Noise Limit	-9.7	-7.6	-4.5	-4.5	-4.8	-4.4	-3.7	-3.0	-2.1
R8 – Macaulay Farm									
Background Noise Curve	34.4	34.7	35.2	35.9	36.9	38.2	39.6	41.3	43.3
Derived Noise Limit	39.4	39.7	40.2	40.9	41.9	43.2	44.6	46.3	48.3
Wind Farm Turbine Noise	30.2	32.4	36.2	36.4	35.3	35.5	35.7	36.1	36.5
Margin Under Noise Limit	-9.2	-7.3	-4.0	-4.5	-6.6	-7.7	-8.9	-10.2	-11.8

Table 12.12 Cumulative Noise Assessment – Night-time

Noise Parameter, $L_{A90,\ 10\ mins}$, dB	Standardised 10m Wind Speed quoted by Manufacturer (ms^{-1})								
	4	5	6	7	8	9	10	11	12
R1 – Gleann Ur North									
Background Noise Curve	27.6	27.9	28.4	29.4	30.7	32.3	34.4	36.7	39.5
Derived Noise Limit	40.0	40.0	40.0	40.0	40.0	40.0	40.0	41.7	44.5
Wind Farm Turbine Noise	26.2	28.5	32.1	31.9	31.1	31.2	31.3	31.4	31.6
Margin Under Noise Limit	-13.8	-11.5	-7.9	-8.1	-8.9	-8.8	-8.7	-10.3	-12.9
R2 – Cnoc Uilleam Chubair									
Background Noise Curve	27.6	27.9	28.4	29.4	30.7	32.3	34.4	36.7	39.5
Derived Noise Limit	40.0	40.0	40.0	40.0	40.0	40.0	40.0	41.7	44.5
Wind Farm Turbine Noise	27.0	29.3	33.0	32.7	31.9	31.9	32.0	32.0	32.1
Margin Under Noise Limit	-13.0	-10.7	-7.0	-7.3	-8.1	-8.1	-8.0	-9.7	-12.4
R3 – Gleann Ur									
Background Noise Curve	27.6	27.9	28.4	29.4	30.7	32.3	34.4	36.7	39.5
Derived Noise Limit	40.0	40.0	40.0	40.0	40.0	40.0	40.0	41.7	44.5
Wind Farm Turbine Noise	28.3	30.6	34.2	34.0	33.2	33.3	33.4	33.5	33.6
Margin Under Noise Limit	-11.7	-9.4	-5.8	-6.0	-6.8	-6.7	-6.6	-8.2	-10.9
R4 – Bennadrove Road									
Background Noise Curve	23.1	24.0	25.0	26.3	27.7	29.3	31.1	33.1	35.3
Derived Noise Limit	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.3
Wind Farm Turbine Noise	28.4	30.7	34.4	34.2	33.4	33.4	33.5	33.6	33.8

Noise Parameter, $L_{A90, 10 mins}$, dB	Standardised 10m Wind Speed quoted by Manufacturer (ms^{-1})								
	4	5	6	7	8	9	10	11	12
Margin Under Noise Limit	-11.6	-9.3	-5.6	-5.8	-6.6	-6.6	-6.5	-6.4	-6.5
R5 – Cnoc Mairi									
Background Noise Curve	23.1	24.0	25.0	26.3	27.7	29.3	31.1	33.1	35.3
Derived Noise Limit	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.3
Wind Farm Turbine Noise	29.9	32.2	35.9	35.7	34.9	34.9	35.0	35.1	35.3
Margin Under Noise Limit	-10.1	-7.8	-4.1	-4.3	-5.1	-5.1	-5.0	-4.9	-5.0
R6 – Creed Bridge									
Background Noise Curve	26.8	27.9	29.0	30.3	31.7	33.3	34.9	36.7	38.6
Derived Noise Limit	40.0	40.0	40.0	40.0	40.0	40.0	40.0	41.7	43.6
Wind Farm Turbine Noise	29.4	31.7	35.3	35.2	34.4	34.5	34.7	34.9	35.3
Margin Under Noise Limit	-10.6	-8.3	-4.7	-4.8	-5.6	-5.5	-5.3	-6.8	-8.3
R7 – Druim Dubh									
Background Noise Curve	20.4	22.7	25.1	27.6	30.2	32.9	35.8	38.7	41.8
Noise Limit (financially involved property)	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0
Wind Farm Turbine Noise	35.3	37.4	40.5	40.5	40.2	40.6	41.3	42.0	42.9
Margin Under Noise Limit	-9.7	-7.6	-4.5	-4.5	-4.8	-4.4	-3.7	-3.0	-2.1
R8 – Macaulay Farm									
Background Noise Curve	27.0	28.1	29.3	30.5	31.9	33.5	35.1	36.8	38.7
Derived Noise Limit	40.0	40.0	40.0	40.0	40.0	40.0	40.1	41.8	43.7
Wind Farm Turbine Noise	30.2	32.4	36.2	36.4	35.3	35.5	35.7	36.1	36.5
Margin Under Noise Limit	-9.8	-7.6	-3.8	-3.6	-4.7	-4.5	-4.4	-5.7	-7.2

12.11.3 The results of the cumulative noise assessment demonstrate that the predicted noise levels at residential receptors do not exceed ETSU-R-97 limits and therefore the cumulative operational effect is not significant.

12.12 Consideration of Optional Additional Mitigation or Compensation

12.12.1 No additional mitigation measures are proposed to reduce the noise effects that are identified in this EIA Report chapter. This is because all relevant and implementable measures have been embedded into the Proposed Development and the noise assessment has been carried out on this basis. These measures are considered to be effective and deliverable.

12.13 Conclusions of Significance Evaluation

12.13.1 The results of the assessment reported within this chapter demonstrate that there are no significant noise related effects as a result of the Proposed Development.

12.14 Implementation of Environmental Measures

12.14.1 **Table 12.13** describes the environmental measures embedded within the Proposed Development and the means by which they would be secured, i.e. through the planning conditions and Construction Environmental Management Plan (CEMP).

Table 12.13 Summary of Environmental Measures to be Implemented – Relating to Noise and Vibration

Environmental Measure	Responsibility for Implementation	Compliance Mechanism
Good practice construction methods aligned with BS 5228:2009:+A1:2014	Developer/Contractor	As part of a CEMP required within a planning condition
Blasting Management Plan	Developer/Contractor	Planning condition
Sound power level limits	Developer	Adherence to not exceeding sound power levels via planning condition

12.15 References

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ISO 9613-2 (1996) Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation. International Standards Organisation.

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13. Traffic and Transport

Non-technical Summary

The likely significant effects of the Proposed Development with respect to traffic and transport have been assessed. The potential effects of changes in road traffic movements on the users of the road network (pedestrians, cyclists, equestrians and drivers) and those living close to it during the construction and operational periods of the Proposed Development have been considered.

The levels of traffic during the construction phase are greater than those associated with the operational phase and were compared against existing traffic volumes in order to determine their significance. Construction traffic associated with the Proposed Development would result in no significant effects in terms of severance, driver delay, pedestrian delay and amenity, fear and intimidation, and accidents and safety.

A Construction Traffic Management Plan would be prepared to manage the daily movements and routing of HGVs. This would ensure that vehicles access the Proposed Development via the most appropriate route and that their arrivals / departures and working hours are programmed to lessen the impact on the road network. Measures, such as temporary signage and traffic management, would also be put in place to ensure safe passage of all vehicles.

13.1 Introduction

13.1.1 This chapter of the EIA Report assesses the likely significant effects of the Proposed Development with respect to Traffic and Transport. The chapter should be read in conjunction with the development description provided in **Chapter 4** and with respect to relevant parts of **Chapter 12: Noise** where common receptors have been considered and where there is an overlap or relationship between the assessment of effects.

13.2 Limitations of this Assessment

13.2.1 There are no limitations relating to Traffic and Transport that affect the robustness of the assessment of the likely significant effects of the Proposed Development.

13.3 Relevant Legislation, Planning Policy, Technical Guidance

13.3.1 The general legislative and policy context for EIA is described in **Chapter 5**.

Legislative Context

13.3.2 There is no specific legislation that needs to be considered when determining the scope of this assessment.

Planning Policy Context

13.3.3 A summary of transport-specific national, regional and local policies and plans is provided in **Table 13.1**. These policies and plans have been considered to help define the scope of the assessment.

Table 13.1 Planning Policy Issues Relevant to Traffic and Transport

Policy reference	Policy issue
National planning policies	
Scotland's Third National Planning Framework (NPF3)	NPF3 is the spatial expression of the Scottish Government's Economic Strategy, and of its plans for infrastructure investment. It is about the ambition to create great places that support sustainable economic growth across the country.
Scottish Planning Policy (SPP) June 2014	The purpose of the SPP is to set out national planning policies which reflect Scottish Ministers' priorities for operation of the planning system and for the development and use of land.
HITRANS Regional Transport Strategy April 2008	The overarching Strategy is the vision for the region, which is to enhance the region's viability, enhancing the region's place competitiveness and thereby attracting and retaining people in the region and making the Highlands and Islands a more attractive place in which to live, to work, to conduct business and to visit.
HITRANS Regional Transport Strategy (Draft) May 2017	The vision of the HITRANS Regional Transport Strategy is 'To deliver connectivity across the region which enables sustainable economic growth and helps communities to actively participate in economic and social activities'. Within this overall vision there are four key transport objectives, as follows: • Reduce journey times and improve reliability and resilience; • Improve safety of transport and travel; • Tackle capacity constraints; and • Improve the quality, accessibility and integration of travel.
The Scottish Energy Strategy: The Future of Energy in Scotland (2017)	The Strategy sets out the Scottish Government's vision for the future national energy system to 2050. It describes the priorities for an integrated approach that considers both the use and supply of energy for heat, power and transport.
Onshore Wind Policy Statement (2017)	The Statement was published alongside the draft Energy Strategy. The Statement continues the Scottish Government's existing onshore wind policy set out in previous publications, highlighting the benefits on onshore wind including low costs technology, opportunities associated with island projects, and supply chain.
Regional planning policies	
Outer Hebrides Local Development Plan (Adopted Plan) November 2018	This document sets out the vision and spatial strategy for the development of land in the Outer Hebrides over the next 10-20 years and the following Policy is of relevance to the Proposed Development: • Policy EI: Energy and Heat Resources: Development proposals for all scales of onshore wind energy development will be assessed against the Supplementary Guidance for Wind Energy Development; • Policy EI 9: Transport Infrastructure: The priority areas for the upgrading and development of the transport infrastructure within, and serving the Outer Hebrides, are: A) the spinal and inter island routes; B) the airports at Barra, Balivanich and Stornoway; C);

Policy reference	Policy issue
	ports and harbours, including ferry facilities for mainland and inter island connections. Development proposals associated with new of improved transport infrastructure and traffic management measures will be required to meet all the following: 1) fit with the character of the area in relation to the Development Strategy and the immediate surrounding area and include a landscaping plan; 2) utilise a sustainable drainage system (SuDS) to deal with surface water; 3) accommodate pedestrians (within settlements) and cyclists, and secure improved road safety related to the proposal, in particular around schools, community or leisure facilities. The Comhairle will support the provision of electric car charging points in new development (subject to appropriate design and layout).

Technical Guidance

13.3.4 The assessment has been conducted with reference to guidance contained in *Guidance Notes No.1: Guidelines for the Environmental Assessment of Road Traffic* (GEART) (Institute of Environmental Assessment, 1993) and the 2002 Scottish Executive publication on *Guide to Transport Assessment for Development Proposals in Scotland*, and the June 2012 *Transport Assessment Guidanc*e.

13.4 Data Gathering Methodology

Study Area

13.4.1 The study area used for this assessment, agreed with CnES during the scoping process, is the transport network that may be affected by the Proposed Development. This includes the following roads on the local road network:

- A859;
- Pentland Road; and
- Arnish Point access road.

Desk Study

13.4.2 The sources of information used for the traffic and transport assessment are listed below in **Table 13.2.**

Table 13.2 Sources of Information used for the Traffic and Transport Assessment

Source	Data
Google Earth/Google Maps	Online mapping
Crashmap	Personal Injury Accidents (PIAs)
Department for Transport	Traffic Counts (A859)

Survey Work

13.4.3 No transport survey work was considered to be required for the purposes of this assessment in light of available published data.

13.5 Overall Baseline

Current Baseline

Site Context

13.5.1 The Proposed Development is located to the west of Stornoway on the Western Isles of Scotland, the extent of which is shown in **Figure 13.1**. It predominantly consists open moorland, with areas of woodland a large number of streams and lochs, parts of which are crofting grazing grounds for sheep or cattle. Surrounding areas are of a generally similar nature.

13.5.2 As identified in **Figure 13.1**, two points of access to the Proposed Development are proposed off the A859. Two secondary accesses are proposed on Pentland Road which intersects the Proposed Development and these would provide a crossing point between the central and northern turbine sections (between turbine 20 and 21). This crossing point would be used to access the 15 turbines located in the northern section of the Proposed Development.

Local Road Network

A859

13.5.3 The A859 Spinal Route links the settlement of Stornoway, located in North Lewis, to Leverburgh on the Isle of Harris and beyond to Lochboisdale in South Uist. It is the main land transport route in the Western Isles.

13.5.4 It is a two-way, single carriageway road that is predominately rural in its nature and sided by open moorland used for sheep, deer grazing and domestic peat cutting. The A859 is subject to a 60mph speed limit; however, this reduces to 40mph upon entering Stornoway and as it routes past Marybank Quarry.

Pentland Road

13.5.5 Pentland Road is a two-way, single track road which intersects through the Proposed Development (east-west) and then forms part of its western boundary. No centre line road markings are present, probably due to its history as a single track road and the limited width of the road which measures between 2.75m - 3.40m in width. The majority of the road is sided by grass verge or drainage and passing bays are located at regular intervals.

Arnish Point Access Road

13.5.6 The Arnish Point Access Road routes between the Arnish Point Dock, which includes the Arnish Fabrication Facility, and the A859. The access road routes across undulating topography.

13.5.7 Arnish Point Access Road is a two-way, single track road measuring approximately 3.30m - 3.80m in width with a number of passing bays measuring approximately 2.80m wide.

Baseline Traffic Flows

13.5.8 In accordance with GEART, traffic flows for the A859 have been obtained from the DfT. Flows were obtained from Count id 88082 (2017) situated close to Creed Park (Grid Reference: NB 39676

31360). This is the most recent traffic count available at the time of writing. The traffic flows are presented in **Table 13.3**.

13.5.9 DfT data is provided as an Annual Average Daily Traffic (AADT) flow. A factor has been applied to this count to reduce the AADT flow (24-hour) to a 12-hr traffic flow to coincide with the typical 12-hr working days which are anticipated during the construction phase of the Proposed Development and to make the assessment more robust. The factor has been derived from Table TRA0307 *'Motor Vehicle Traffic Distribution by time of day and day of the week on all roads, Great Britain: 2017'*.

Table 13.3 2017 Traffic Flows – Count id 88082 (A859)

Highway Link	HGVs	Total Traffic
A859 (close to Creed Park) – AADT	109	3,684
A859 (close to Creed Park) – 12-hour	85	2,887

Personal Injury Accidents (PIAs)

13.5.10 Records of the personal injury accidents (PIAs) have been obtained from the CrashMap database (https://www.crashmap.co.uk/) which uses information collected from the Police. This data is approved by the National Statistics Authority and reported on by the Department for Transport (DfT) each year.

13.5.11 Records have been obtained over a five-year period between January 2013 and December 2017. Further investigation will be undertaken if more than 5 accidents are recorded in the five year period.

13.5.12 do not exceed this threshold, and therefore no further investigation is deemed necessary as part of this assessment.

13.5.13 The impact of casualties differs according to the severity of the injuries sustained. Three groups are usually differentiated as follows:

- **Fatal:** any death that occurs within 30 days from causes arising out of an accident;
- **Serious:** records casualties who require hospital treatment and have lasting injuries, but who do not die within 30 days of an accident; and
- **Slight:** where casualties have injuries that do not require hospital treatment, or, if they do, the effects of the injuries quickly subside.

13.5.14 A review of PIAs on the local highway network in the vicinity of the Proposed Development has been undertaken at the following junctions and links:

- The link along the A859 between the junction with the B897 to the south, and with the Pentland Road to the north; and
- The junction with the A859 / Pentland Road.

13.5.15 A summary of the PIAs recorded at the above locations is presented in **Table 13.4.**

Table 13.4 Summary of Recorded PIAs in Proximity to the Proposed Development

	Severity			
Description	**Slight**	**Serious**	**Fatal**	**Total**
A859 link between the junction with the B897 and the B858	4	0	0	4
Junction with the A859 / A858	1	0	0	1

Construction Traffic Route Options

Route Option for HGVs

13.5.16 There are two potential options for the sourcing of aggregate for the Proposed Development.

- Option 1 – Source the stone off-site from existing quarries on Lewis; and
- Option 2 – Source the stone from on-site borrow pits (five borrow pits have been identified).

13.5.17 For the purposes of this assessment, it is assumed that, as a worst-case, all concrete would be sourced off-site from the local batching plant at Marybank Quarry.

13.5.18 Construction HGV traffic is proposed to route to the Proposed Development from Arnish Point Dock or from one of the existing on-island quarries, which would ultimately require it all to route on the A859. The majority of construction HGV movements would occur within the Proposed Development using purpose built on-site tracks.

13.5.19 As illustrated in **Figure 13.1**, it is anticipated that there would be two site accesses on the A859; one close to the Creed Enterprise Park, and one utilising an existing junction approximately 300m south of the existing access to Breedon Marybank Quarry.

13.5.20 A vehicle crossing point is proposed on Pentland Road between turbine numbers 20 and 21. This crossing point would be used for the delivery of turbine components and construction HGVs to the northern section of the Proposed Development. It is not anticipated that this crossing would be used as a direct entrance for HGV traffic from Pentland Road.

13.5.21 A Construction Traffic Management Plan (CTMP) is expected to be submitted pursuant to the deemed planning permission prior to the use of any of the site accesses.

Route for Abnormal Loads

13.5.22 Due to the abnormal size and loading of wind turbine delivery vehicles, it is necessary to review the public roads that would provide access to the Proposed Development to ensure they are suitable, and to identify any modifications required to facilitate access for delivery vehicles. A preliminary access study was undertaken in 2010, and this has been updated with the larger turbine components currently proposed. Route Analysis has been conducted for the turbine delivery route to site (see **Appendix 13A)**.

13.5.23 It is assumed that the turbine components would be shipped to the Arnish Point Dock. Arnish Point offers a deep water quay with unrestricted access to the Atlantic Ocean and North Channel. Arnish Point has previously used for shipment of materials and completed fabricated components. The Highlands and Islands Enterprise would be consulted to ensure that there is sufficient storage space for wind turbine components prior to construction. This would be carried out pre construction, after a contractor appointment.

13.5.24 Abnormal loads would route along the Arnish Point Access Road for approximately 3.2km before reaching the priority junction with the A859. The junction is situated approximately 190m south of Creed Bridge. Details of the abnormal loads route and any section of road improvement or other works is set out in **Appendix 13A**.

13.5.25 Upgrades to the Arnish Point Access Road may occur in the future. However, any alterations to the Arnish Point Access Road would be the subject of a separate planning application and are not part of this application.

13.6 Future Baseline

13.6.1 The Department for Transport (DfT) provide traffic growth projections to help inform future baseline. Background traffic is predicted to increase even if development does not proceed. Background traffic has been factored to the year of construction in order to undertake an assessment of effects.

13.6.2 To assess the future year construction scenario assumed to be 2021, growth rates have been applied to the base traffic data (2017) using TEMPro Version 7.2, which is the industry standard means of forecasting future traffic flows. The TEMPro growth factors used the following geographical areas of Comhairle nan Eilean Siar 1, Comhairle nan Eilean Siar 2 and Comhairle nan Eilean Siar 3 and the forecast 2021 traffic flow for the A859 is presented in **Table 13.5**.

Table 13.5 2021 Future Baseline Traffic Flows – Count id 88082 (A859)

Highway Link	HGVs	Total Traffic
A859 (close to Creed Park) – 12-hr	87	2,959
A859 (close to Creed Park) – AADT	112	3,774

13.7 Consultation

13.7.1 A scoping request was made to the Scottish Ministers through the Energy Consents Unit in July 2018 (**Appendix 2A**), and a response ('scoping opinion') was received on 27 September 2018 (**Appendix 2B**).

13.7.2 In relation to the Traffic and Transport, the response from Transport Scotland confirmed:

"Given the location of the revised development and its remoteness from the trunk road network, Transport Scotland accepts that the development will not give rise to any significant traffic or related environmental impacts on the Trunk Road Network"

13.7.3 The roads department at CnES were consulted in November 2018 to seek personal injury accident data, scope the study area and roads for inclusion within the assessment and request traffic survey data on the A859. Available traffic and accident data from CnES was superseded by available data from the DfT and the online resource Crashmap for person injury accident data.

13.8 Scope of the Assessment

Highway Links

13.8.1 This chapter considers the potential effects of changes in road traffic movements on receptors, i.e. the users of this road network (pedestrians, cyclists, equestrians and drivers) and those living close to it.

13.8.2 The A858 is located on a route that development traffic would use. These highways provide comprehensive coverage of the routes surrounding the Proposed Development. Beyond this road, traffic from the Proposed Development would access the wider road network where its effects would be diluted by existing traffic on these or would distribute to a point where the effects from traffic would be negligible.

13.8.3 Receptors along A858 have been identified within the scope of assessment in relation to the potentially significant traffic-related effects.

Temporal Scope

13.8.4 The temporal scope of the assessment of Traffic and Transport Proposed Development covers the construction and operational periods for the Proposed Development. Effects from decommissioning are considered to be similar to, or less than those associated with construction (since most below ground elements such as turbine foundations be left in situ). Given the unknown conditions of the highway following the lifecycle of the wind farm, a detailed assessment is not considered necessary.

Potential Receptors

13.8.5 Receptors are the users of highway network assets and facilities such as pedestrians, cyclists, equestrians and drivers who travel within the vicinity of the Proposed Development.

13.8.6 GEART identifies the following groups and special interest groups that may be affected:

- People at home;
- People at work;
- Sensitive groups including children, elderly and disabled;
- Sensitive locations such as hospitals, churches, schools and historical buildings;
- Pedestrians;
- Cyclists;
- Open spaces, recreational areas and shopping areas;
- Sites of ecological and nature conservation value; and
- Sites of tourist/visitor attractions.

Likely Significant Effects Scoped In

13.8.7 The environmental effects that can occur as a result of traffic associated with the Proposed Development, and which are subject to further assessment in this chapter, are as follows:

- Severance: the separation of people from places and other people and places or impede pedestrian access to essential facilities;
- Driver Delay: traffic delays to non-development traffic;
- Pedestrian Amenity: the effect on the relative pleasantness of a pedestrian journey as a result of changes in traffic flow, traffic composition and pavement width / separation from traffic;
- Pedestrian Delay: the ability of people to cross roads as a result of changes in traffic volume, composition and speed, the level of pedestrian activity, visibility and general physical conditions of the Proposed Development;
- Fear and intimidation: these may be experienced by people as a result of an increase in traffic volume and its HGV composition, its proximity or the lack of protection caused by such factors as narrow pavement widths;
- Accidents and Safety: the risk of accidents occurring where the Proposed Development is expected to produce a change in the character of traffic.

Effects Scoped Out of the Assessment

13.8.8 Approximately 8 HGV movements per hour (4 in, 4 out) are predicted to cross Pentland Road to route to/from the north section of the Proposed Development in the peak construction month. Accesses here are not to be used directly for deliveries (main accesses are located on the A859). The crossing is proposed to be managed from temporary traffic lights or banksmen, when required. Onsite observations identified that Pentland Road is lightly trafficked, given its rural location and any delay caused would be kept to a minimum and managed by the CTMP. An assessment of effects on Pentland Road has been scoped out of the assessment for both construction and operation phases.

13.8.9 The anticipated volume of traffic generated during the operation of the Proposed Development is expected to be considerably less than that during the construction phase, likely to consist of mainly light vehicles associated with ad-hoc maintenance and weekly monitoring visits. Potential effects on users of the road network and adjacent land uses as a result of operation traffic are therefore not likely to be significant and therefore are scoped out of the detailed assessment.

13.8.10 The Proposed Development is not expected to generate or attract any hazardous loads and this topic has therefore been scoped out of the detailed assessment for both construction and operation phases.

13.8.11 The following potential traffic and transport related effects are not considered in this chapter as they are addressed in other chapters within this EIA Report:

- Noise (**Chapter 12**);
- Visual Effects (**Chapter 6**);
- Ecological Effects (**Chapter 9**); and
- Historic Environment Effects (**Chapter 7**).

13.9 Environmental Measures Embedded into the Development Proposals

13.9.1 The CTMP would be developed recognising the need to manage the traffic impact as a part of the Proposed Development. The following section describes the potential effects and the rationale for incorporating embedded mitigation into the Proposed Development to help avoid effects occurring, or to reduce the magnitude of any changes associated with it. The following measures would be incorporated:

- A CTMP to manage the daily delivery profiles and control movements and routing of HGVs through the following measures:
  - Traffic routing strategy – ensuring vehicles access the Proposed Development via the most appropriate route and avoid unnecessary conflict with sensitive areas;
  - Traffic timing strategy – programme vehicles arrivals / departures and working hours to lessen the impact on the highway network;
  - Temporary signage – in accordance with Department for Transport (DfT) *Traffic Signs Manual, Chapter 8* to inform local road users of construction access points and the presence of HGVs;
  - Traffic Marshals – to marshal access points and Core Path crossings whilst deliveries are taking place;
  - Temporary traffic management – provided on approaches to accesses in the form of traffic warning signs, possible reductions in speed limit signs to ensure safe passage of vehicles. All signage in accordance with DfTs *Traffic Signs Manual, Chapter 8*;
  - Site accesses designed in accordance with Design Manual for Roads and Bridges (DMRB); and
  - Staff Travel Plan – would provide details of how staff should travel to the Proposed Development in an effort to reduce single occupancy vehicle journeys.

13.10 Assessment Methodology

Methodology for the Prediction of Effects

13.10.1 The project description is set out in **Chapter 4**. Whilst this has informed the approach that has been used in this Traffic and Transport assessment, it is necessary to set out how this methodology has been applied, and adapted as appropriate, to address the specific needs of this Traffic and Transport assessment.

13.10.2 The guidance that is followed when assessing the potential significance of road traffic effects is summarised in GEART (IEA, 1993), which states that:

"The detailed assessment of impacts is…likely to concentrate on the period during which the absolute level of an impact is at its peak, as well as the hour at which the greatest level of change is likely to occur." (Paragraph 3.10).

13.10.3 To assess the impact at its peak, the likely percentage increase in traffic is determined by comparing estimates of traffic generated by the Proposed Development with future predicted baseline traffic flows (in 2021 – year of construction) on the road links in the vicinity of the Proposed Development.

13.10.4 GEART provides two rules that are used to establish whether an environmental assessment of traffic effects should be carried out on receptors:

- Rule 1: Include highway links where traffic flows are predicted to increase by more than 30% (or where the number of HGVs is predicted to increase by more than 30%); and

- Rule 2: Include sensitive areas where traffic flows are predicted to increase by 10% or more.

13.10.5 It should be noted that, according to GEART, predicted traffic flow increases below 10% are generally not considered to be significant as daily variations in background traffic flow may fluctuate by this amount. Changes in traffic flows below this level are, therefore, assumed not to result in significant environmental effects and have therefore not been assessed further as part of this study.

13.10.6 No difficulties technical deficiencies or lack of technical information was encountered during the preparation of this assessment.

Receptor Sensitivity

13.10.7 The sensitivity of each highway link included in the assessment has been assigned a sensitivity in accordance with GEART. This is based on the proximity of sensitive receptors to the highway link and the highway environment. **Table 13.6** summarises the rationale used to determine the sensitivity against the corresponding receptors as part of the assessment as contained in GEART. Professional judgement is also used to determine the sensitivity of the receptor.

Table 13.6 Receptor Sensitivity

Sensitivity	Description / Reason	Receptor
High	Receptors of greatest sensitivity to traffic flows: schools, colleges, playgrounds, accident blackspots, retirement homes and urban/residential homes without footways that are used by pedestrians and cyclists	Residents/workers travelling to and from work or home on foot and by bicycle, school children, leisure walkers and equestrians
Medium	Traffic flow sensitive receptors including: congested junctions, doctors' surgeries, hospitals, shopping areas with roadside frontage, roads with narrow footways, unsegregated cycle ways, community centres, parks, recreation facilities	Residents/workers travelling to and from work or home on foot and by bicycle, people visiting these land uses
Low	Receptors with some sensitivity to traffic flows: places of worship, public open space, nature conservation areas, listed buildings, tourist/visitor attractions and residential areas with adequate footway provision	Residents/workers travelling to and from work or home on foot or bicycle and people visiting these land uses
Negligible	Receptors with low sensitivity to traffic flows: Motorway and Dual Carriageways and/or land uses sufficiently distant from affected routes and junctions	Residents/workers travelling by foot or by bicycle

13.10.8 Sensitivity judged as High or Medium results in Rule 2 (sensitive areas where traffic flows are predicted to increase by 10% or more) being considered for that highway link. Sensitivity judged as Low or Negligible results in Rule 1 being considered for that highway link (where traffic flows are predicted to increase by more than 30% (or where the number of HGVs is predicted to increase by more than 30%)).

13.10.9 Given the potential receptors described, **Table 13.7** identifies the sensitivity of highway link and the GEART Rule that applies.

Table 13.7 Locations Sensitive to Changes in Traffic Flows

Highway Link	Rationale	Receptor Sensitivity	Assessment (Rule 1/2)
A859 (between Breedon Marybank Quarry and Creed Park)	Wide carriageway. No footways. No sensitive land uses fronting the carriageway. Several bus stops identified but only one provides a shelter – others remain unmarked.	Negligible	Rule 1

Magnitude of Change

13.10.10 **Table 13.8** provides a summary of the magnitude of Change for each transport effect, with the thresholds used to determine this being based on guidance within GEART.

Table 13.8 Magnitude of Change

	Magnitude of Impact			
Transport Effect	**High**	**Medium**	**Low**	**Negligible**
Severance	Change in total traffic or HGV flows over 91%	Change in total traffic or HGV flows of 61-90%	Change in total traffic or HGV flows of 31-60%	Change in total traffic or HGV flows of less than 30%
Driver Delay	Change in total traffic or HGV flows over 91%	Change in total traffic or HGV flows of 61-90%	Change in total traffic or HGV flows of 31-60%	Change in total traffic or HGV flows of less than 30%
Pedestrian Amenity and Delay	Change in total traffic or HGV flows over 91%	Change in total traffic or HGV flows of 61-90%	Change in total traffic or HGV flows of 31-60%	Change in total traffic or HGV flows of less than 30%
Accident and Safety	Informed by a review of existing collision patterns and trends based upon the existing personal injury accident records and the forecast increase in traffic.			

Significance Criteria

13.10.11 The classification of a likely traffic and transport effect is derived by considering the sensitivity of the receptor (derived from **Table 13.7**) against the magnitude of change (derived from **Table 13.8**) as defined in **Table 13.9** below. The shading indicates those significance ratings that are deemed to be 'significant' effects.

Table 13.9 Significance Matrix

		Magnitude of Change			
		High	**Medium**	**Low**	**Negligible**
Receptor Sensitivity	**High**	Major	Major	Moderate	Negligible
	Medium	Major	Moderate	Minor	Negligible
	Low	Moderate	Minor	Minor	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

13.10.12 Major and Moderate adverse change represent effects considered to be significant in terms of the EIA guideline, whilst Minor and Negligible significance are considered neutral/not significant.

Methodology for Assessing Environmental Effects

GEART Criteria

13.10.13 In relation to traffic and transport, the significance of each effect identified in **Section 13.7** has been considered against the criteria within GEART, where possible. However, GEART states that:

'For many effects there are no simple rules or formulae which define thresholds of significance and there is, therefore, a need for interpretation and judgement on the part of the assessor, backed-up by data or quantified information wherever possible. Such judgements will include the assessment of the numbers of people experiencing a change in environmental impact as well as the assessment of the damage to various natural resources.' (Paragraph 4.5, IEA, 1993).

Severance

13.10.14 There are no predictive formulae which give simple relationships between traffic factors and levels of severance. GEART states that changes in traffic flow of 30%, 60% and 90% are regarded as producing 'slight', 'moderate' and 'substantial' changes in severance. In general, marginal (slight) changes in traffic flow are, by themselves, unlikely to create or remove severance.

Driver Delay

13.10.15 GEART states that delays are only likely to be significant when the traffic on the network surrounding the development is already at, or close to, the capacity of the system. The capacity of a road or a particular junction can be determined by establishing the ratio of flow to capacity (RFC).

13.10.16 For this assessment, criteria from GEART has been used to assess the effects on traffic levels and driver delay, which states the need for assessment where changes in traffic flows exceed 30%.

Pedestrian Delay

13.10.17 Given the range of local factors and conditions which can influence pedestrian delay, GEART does not recommend that thresholds be used as a means to establish the significance of pedestrian delay but recommend that reasoned judgements be made instead. However, GEART suggests a lower threshold of 10 seconds delay and upper threshold of 40 seconds delay which, for a link with no crossing facilities, equates to the lower threshold of a two-way flow of 1,400 vehicles per hour. For this assessment, the significance of the effects of construction traffic on pedestrian delay would be based on professional judgement and interpretation.

Pedestrian Amenity

13.10.18 GEART notes that changes in pedestrian amenity may be considered significant where the traffic flow is halved or doubled, with the former leading to a positive effect and the latter a negative effect.

Fear and Intimidation

13.10.19 There are no commonly agreed thresholds by which to determine the significance of this effect. GEART notes that special consideration should be given to areas where there are likely to be particular problems, such as high-speed sections of road, locations of turning points and accesses.

Consideration should also be given to areas frequented by school children, the elderly and other vulnerable groups.

Accidents and Safety

13.10.20 This is informed by a review of existing collision patterns and trends based upon the existing personal injury collision records and the forecast increase in traffic.

13.10.21 For this assessment, the significance of the effects of construction traffic on accidents and safety would be based on professional judgement and interpretation.

13.11 Assessment of Traffic and Transport Effects

13.11.1 This section provides an assessment of the effects arising from traffic generated by the Proposed Development.

Construction Programme

13.11.2 Where possible, construction operations would be carried out concurrently, thus minimising the overall length of the construction programme. The Proposed Development would be phased such that civil engineering works would continue whilst wind turbines are erected elsewhere on the Proposed Development. Site restoration would be programmed and carried out to allow restoration of disturbed areas as to begin as early as possible in a progressive manner. On this basis, an indicative 30-month construction programme (commencing in 2021) has been assumed for the purposes of this assessment.

13.11.3 As mentioned in **Section 13.5.16**, there are two potential options to consider for the construction of the Proposed Development; Option 1 accounts for stone being sourced off-site, with Option 2 assuming all stone is won from on-site borrow pits.

13.11.4 A summary of predicted traffic generation for the Option 1 is shown in **Table 13.10**, with a detailed table showing the full construction period provided in **Appendix 13B** for both option 1 and option 2.

Table 13.10 Predicted Traffic Generation during Construction Phase – Option 1 (Aggregate Sourced Off-Site)

Activity	Total Loads	Total Trips (two way)
Delivery of Plant and Equipment	30	60
Delivery of Road Stone for Access Tracks	9,253	18,506
Delivery of Road Stone for Areas of Crane Operation	2,363	4,726
Delivery of Fibre Optic Cabling	11	22
Delivery of Concrete for Control Building Base	37	74
Delivery of Road Stone for Construction Compound	2,268	4,536
Delivery of Back fill Stone for Turbines	2,205	4,410
Delivery of Road Stone for substation	1,376	2,752
Delivery of Culvert and Bridge Materials	210	420

Activity	Total Loads	Total Trips (two way)
Delivery of Geogrid	63	126
Delivery of Sand for Cable Trench	366	732
Delivery of Compound General Equipment	90	180
Delivery of Electrical Equipment	60	120
Delivery of External Transformers	12	24
Delivery of Cabling	27	54
Delivery of Concrete for Turbines	1,455	2,910
Concrete for Transformer Foundations	32	64
Delivery of HV Plinth Concrete	45	90
Delivery of Base Rings	18	36
Delivery of Shuttering	35	70
Delivery of Form work and reinforcing steel	44	88
Delivery and Removal of Mobile Crane	22	44
Delivery of Turbines	350	700
Removal of Plant and Equipment	30	60
Total	**20,402**	**40,804**

13.11.5 For Option two, the aggregate/stone elements noted in **Table 13.10** would not be required and this would result in a requirement of 2,938 total loads and 5,876 total trips (two-way). This equates to an 86% reduction in traffic movements.

13.11.6 Option 1 scenario results in a peak construction movement of 210 two-way HGVs (105 arrive, 105 depart) which are predicted to occur during month 4 of the 30-month construction programme.

13.11.7 Option 2 scenario results in a peak construction movement of 38 two-way HGVs (19 arrive, 19 depart) which are predicted to occur during month 6 of the 24-month construction programme.

13.11.8 A construction route would be submitted to CnES as part of the CTMP pursuant to a condition of the deemed planning permission. Wherever possible construction traffic would be scheduled to avoid peak hour travel to ensure minimal disruption.

13.11.9 **Table 13.11** shows the percentage change in traffic flows in 2021, with construction traffic on the local road network for both Option 1 and Option 2 stone sourcing scenarios. The GEART screening exercise is also presented within this table. Percentage increases that exceed the relevant GEART threshold of assessment rule would be subject to further assessment. Any increase that is below the GEART threshold would not be taken forward for assessment.

Table 13.11 Forecast Baseline Traffic for 2021 with Predicted Construction Traffic

Highway Link	GEART Rule Screening	2021 Base		Construction Traffic	2021 Base + Construction		% change	
		HGVs	Total	HGVs	HGVs	Total	HGVs	Total Traffic
Option 1 – Aggregate Sourced Off-site								
A859	Rule 1	87	2,959	210	297	3,169	241.4%	7.1%
Option 2 – Aggregate Sourced from Borrow Pits								
A859	Rule 1	87	2,959	38	125	2,997	43.7%	1.3%

13.11.10 Given the potential receptors described in **Table 13.7**, **Table 13.11** identifies that the A859 highway link should be taken forward for assessment based on the percentage impact on this link exceeding the 30% threshold in HGVs (Rule 1). The assessment of environmental effects on the A859 has been undertaken based on these percentage impact results.

13.12 Predicted Effects and their Significance: Construction Phase

13.12.1 The GEART threshold is exceeded by 211.4% in HGV flows if Option 1 scenario is progressed [worst-case]. This level of percentage increase is exacerbated due to particularly low baseline volumes of HGV traffic which can be expected given the location and setting of the Proposed Development and road network serving the Isle of Lewis.

13.12.2 The GEART threshold is exceeded by 13.7% in HGVs flows if Option 2 is progressed (it being the intention of the developer to utilise up to five borrow pits to source aggregate on-site).

13.12.3 It should be noted that increases in total traffic are only 7.1% and 1.3% during Option 1 and 2 respectively.

Severance

13.12.4 There are no pedestrian facilities along the A859 between Breedon Marybank Quarry and the proposed accesses on the A859. The only section that could be impacted by construction traffic would be in the vicinity of the access to Creed Park, where pedestrians are likely to cross the carriageway to access the bus stop on the western side of this road. Visibility for crossing in either direction on the A859 is very good.

13.12.5 Given that the highway link has a Negligible receptor sensitivity (**Table 13.7**) and increases in HGVs over 91% [Option 1 – worst case] result in High magnitude of change (**Table 13.8**), the level of effect is considered to be of Negligible significance overall (**Table 13.9**). This is considered to be not significant in terms of the EIA Regulations.

13.12.6 If borrow pits are used to source aggregate on-site (Option 2), effects remain negligible. It should be noted that daily HGV movements will reduce in this scenario from 210 to 38.

Driver Delay

13.12.7 Given that the highway link has a Negligible receptor sensitivity (**Table 13.7**) and increases in HGVs over 91% [Option 1 – worst case] result in High magnitude of change (**Table 13.8**), the level of effect is considered to be of Negligible significance overall (**Table 13.9**). Any delay experienced would be mitigated further through the application of a CTMP to ensure HGV traffic avoids peak hours where reasonably possible. This effect considered to be not significant in terms of the EIA Regulations.

13.12.8 If borrow pits are used to source aggregate on-site (Option 2), effects remain negligible. It should be noted that daily HGV movements will reduce in this scenario from 210 to 38.

Pedestrian Delay & Amenity

13.12.9 There are no pedestrian facilities along the A859 between Breedon Marybank Quarry and the proposed accesses on the A859. The only section that could be impacted by construction traffic would be in the vicinity of the access to Creed Park, where pedestrians are likely to cross the carriageway to access the bus stop on the western side of this road.

13.12.10 Existing pedestrian patronage from Creed Park is assumed to be low in volume and infrequent. Furthermore, visibility for crossing in either direction on the A859 is very good.

13.12.11 Given that the highway link has a Negligible receptor sensitivity (**Table 13.7**) and increases in HGVs over 91% [Option 1 – worst case] result in High magnitude of change (**Table 13.8**), the level of effect is considered to be of Negligible significance overall (**Table 13.9**). This is considered to be not significant in terms of the EIA Regulations.

13.12.12 If borrow pits are used to source aggregate on-site (Option 2), effects remain negligible. It should be noted that daily HGV movements will reduce in this scenario from 210 to 38.

Fear and Intimidation

13.12.13 There are no pedestrian or cyclist facilities along the A859 between Breedon Marybank Quarry and the proposed accesses on this road and pedestrian/cyclist volumes and frequency are therefore expected to be low and infrequent. Only three cyclist movements were recorded by the DfT in 2017.

13.12.14 It is therefore considered that the scale of fear and intimidation likely to be experienced by pedestrians as a result of changes in traffic flows is not significant.

13.12.15 If borrow pits are used to source aggregate on-site (Option 2), effects remain negligible. It should be noted that daily HGV movements will reduce in this scenario from 210 to 38.

Accidents and Safety

13.12.16 Analysis of recorded PIAs at key locations on the local road network showed no fatalities occurred during the last five years, and none were caused as a result of existing road / junction design. All of the recorded accidents were slight in severity.

13.12.17 There is nothing to suggest that the construction of the Proposed Development would increase the likelihood of accidents and reduce safety, particularly with the CTMP in place. No significant effects in respect of accidents and safety are therefore anticipated.

13.12.18 A summary of the results of the assessment is provided in **Table 13.12**.

Table 13.12 Summary of Significance of Adverse Effects – A859

Receptor and summary of predicted effects		Sensitivity	Significance[3]	Summary rationale
Severance	The separation of people from places and other people	Negligible	Not significant	Given no pedestrian facilities on the A859 and low and infrequent pedestrian movements combined with negligible receptor sensitivity, the changes in traffic flow would not result in the separation of people from other people and places or impede pedestrian access to essential facilities.
Driver Delay	Traffic delays as a result of construction traffic	Negligible	Not significant	Whilst changes in traffic flow exceed 91%, the negligible receptor sensitivity of the A859 means that the level of effect is considered to be of Negligible significance overall. A CTMP would be employed to help mitigate any delays experienced.
Pedestrian Delay & Amenity	The ability to people to cross roads and the effect on the relative pleasantness of a pedestrian journey	Negligible	Not significant	Given no pedestrian facilities on the A859 and low and infrequent pedestrian movements combined with negligible receptor sensitivity, the changes in traffic flow would not result in pedestrian delay.
Fear and Intimidation	The levels experienced by pedestrians and cyclists, its proximity to people or the lack of protection caused by such factors as narrow pavement widths.	Negligible	Not significant	Given no pedestrian facilities on the A859 and low and infrequent pedestrian movements combined with negligible receptor sensitivity, the changes in traffic flow would not result in increased fear and intimidation experienced.
Accidents and Safety	The risk of accidents occurring where development is expected to produce a change in the character of traffic	Negligible	Not significant	Changes in traffic flows would not elevate the risk of accident and safety issues occurring on the local road network.

13.13 Assessment of Cumulative Effects

13.13.1 Consideration has been given as to whether any of the receptors that have been taken forward for assessment in this chapter are likely to be subject to cumulative effects because of the Traffic and Transport effects generated by other developments.

13.13.2 A review of online planning application maps shows that there are three consented wind farm developments in the area close the Proposed Development. These are:

- Muaitheabhal Beinn Mhor;
- Muaitheabhal Beinn East Extension; and
- Muaitheabhal Beinn South Extension.

13.13.3 The above schemes are situated approximately 20km south of the Proposed Development near Eishken. It is understood that the three schemes have similar construction programmes as the Proposed Development (start Q2 2021 – end Q4 2023). As with the Proposed Development, it is the intention of the developer of these projects to source aggregate for tracks, turbine bases and hardstandings from borrow pits. However, it may be necessary to import some aggregate for use as capping material for access tracks and hardstandings.

13.13.4 A dedicated berthing facility for the direct delivery of wind turbine components associated with the Muaitheabhal Wind Farm schemes achieved consent however, this expired in August 2018. The facility is proposed to be situated on the north shore of Loch Sealg, close to the properties at Eishken. Should consent be regained for this development, all turbine components and abnormal loads associated with the Muaitheabhal Wind Farm would be shipped to this facility and not Arnish Point.

13.13.5 Despite the concurrent construction programme between the Proposed Development and the three Muaitheabhal Wind farm schemes [and assuming that Arnish Point Dock is used for delivery of the Muaitheabhal components], it is understood that any overlapping activities resulting in high volumes of HGVs would be minimised where reasonably possible. A daily maximum of 51 two-way HGVs per day have been identified to route south on the A859. No cumulative assessment was undertaken as part of the Muaitheabhal Wind farm assessments.

13.13.6 Furthermore, the development of a CTMP for each scheme is anticipated to reduce any cumulative effects experienced on the road network, namely the A859. Should borrow pits provide the source of aggregate, this would minimise cumulative effects further. Typical measures included in a CTMP are provided in **Section 13.9**.

13.13.7 On this basis, it is considered that significant cumulative effects are unlikely.

13.14 Consideration of Optional Additional Mitigation or Compensation

13.14.1 No additional mitigation measures are proposed to further reduce the Traffic and Transport effects that are identified in this EIA Report. This is because all relevant and implementable measures have been embedded into the development proposals and are assessed in this chapter. These measures are considered to be effective and deliverable and no likely significant effects have been identified.

13.15 Conclusions of Significance Evaluation

13.15.1 As summarised in **Table 13.12**, construction traffic associated with the Proposed Development would result in no significant effects in terms of severance, driver delay, pedestrian delay and amenity, fear and intimidation, and accidents and safety.

13.16 Implementation of Environmental Measures

13.16.1 **Table 13.13** describes the environmental measures embedded within the Proposed Development and the means by which they would be implemented.

Table 13.13 Summary of Environmental Measures to be Implemented – Traffic and Transport

Environmental Measure	Responsibility for Implementation	Compliance Mechanism	EIA Report Section Reference
Construction Traffic Management Plan (CTMP)	*Developer*	*By planning condition*	*Section 13.9*

14. Socio Economics

Non-Technical Summary

In terms of Socio-Economics, the potential effects on population, health, employment and economy, tourism and recreation and land use as a result of the Proposed Development have been considered.

It is estimated that the capital cost of constructing the Proposed Development could equate to investment estimated to be up to between £229m and £353m. During the construction phase, the Proposed Development could directly support up to 307 Full Time Equivalent (FTE) local jobs, and up to 921.3 FTE jobs within Scotland for the duration of the construction phase (about 30 months). During its operational phase, employment related to operations and maintenance for the Proposed Development could directly support up to 208.3 FTE jobs, of which up to 87.7 FTE jobs could be local and up to 120.6 FTE jobs would be likely to be within Scotland. Other employment is likely to be supported or generated through induced and indirect economic and employment effects throughout all phases of the Proposed Development. Details of how the figures stated above have been calculated are set out in Chapter 14 Socio-Economics of the EIA Report.

The construction, operational and decommissioning effects as a result of the Proposed Development, whether individually or cumulatively, are not predicted to result in significant effects in an EIA context on tourism or recreational receptors. During construction and decommissioning, public access within the Development Site would be subject to short term temporary restrictions (e.g. for health and safety reasons), however once operational, the Development Site would offer improved access, through the construction of 28.7km of new access tracks.

Compensatory payments will be made to crofters for loss of grazing land as a result of the Proposed Development.

In addition to the economic benefits during the construction, operation and decommissioning phases, the proposed community benefit fund would result in significant local level benefit. The Proposed Development would make an annual payment of £5,000 (index-linked) per MW over the lifetime of the project. For the 196MW Proposed Development this would mean an annual payment of over £980,000 which would equate to over £24.5M during the 25 year operational period.

There are no significant effects predicted in an EIA context for population, health or tourism and recreation from the construction, operation and decommissioning phases of the Proposed Development.

14.1 Introduction

14.1.1 This chapter of the EIA Report assesses the likely significant effects of the Proposed Development with respect to Socio-Economics. The chapter should be read in conjunction with the development description provided in **Chapter 4: Description of the Proposed Development** and with respect to relevant parts of other chapters **Chapter 6: Landscape and Visual Impact, Chapter 7: Historic Environment, Chapter 9: Ecology, Chapter 11: Geology, Hydrology and Hydrogeology, Chapter 12: Noise and Chapter 13: Traffic and Transport**, where common receptors have been considered and where there is an overlap or relationship between the assessments of effects.

14.1.2 This chapter qualitatively assesses the potential impact of the Proposed Development on the baseline socio-economic situation of the local community and wider environment. This includes on Lewis and nationally in Scotland. Impacts in relation to tourism and recreation both within and in close proximity to the Development Site and the wider Lewis area are also assessed along with public safety issues.

14.1.3 Following a summary of relevant policy and legislation, this chapter describes the assessment methodology that has been adopted, the overall baseline conditions and how the Proposed Development design has evolved. An assessment of the effects of the Proposed Development is then presented, followed by details of the mitigation measures required to avoid, minimise, or compensate for any significant adverse effects identified. The chapter concludes with a summary of residual effects and an evaluation of their significance following the incorporation of mitigation measures.

14.1.4 The current baseline situation has been established with reference to publicly available information sources to reflect likely changes in demographics and economic circumstances in the Study Area (defined at **Section 14.4.1** below). Previous research findings in relation to public and tourist attitudes towards wind farms have also been referred to.

14.1.5 The Proposed Development may result in socio-economic effects at the regional level, for example, in relation to economic development, and also at the district/local level, principally affecting those who live in or visit the surrounding area. The potential effects resulting from the construction/decommissioning and operation of the Proposed Development are:

- Direct effects on economic activity during operation (e.g. business rates payable by the wind farm operator);
- Indirect and induced effects on economic activity at a regional and local level (e.g. supply chain, land rental, multiplier effects, economic stimulus generated from the expenditure of additional employment income) during construction and to a lesser extent, decommissioning;
- Direct effects on employment levels (e.g. construction workers) during construction, and to a lesser extent, operation and then decommissioning;
- Direct effects on land use within the Development Site (e.g. loss of agricultural land, core paths) during construction, operation and decommissioning; and
- Indirect effects on recreational use and tourism related business during construction, operation and decommissioning.

14.1.6 It is also pertinent to note that from a socio-economic context, the Proposed Development would make a contribution to the alleviation of the adverse consequences of global warming. This would be by providing an alternative and renewable source of energy that does not involve the emission of greenhouse gases during operation, compared with the greenhouse gas emissions associated with electricity produced using fossil fuels. Such beneficial effects cannot readily be ascribed to particular individuals or groups, nor the scale of the benefit readily considered other than simply in terms of the amount of power generation and total level of emissions avoided. Nonetheless, for the purposes of this assessment, the contribution of renewable energy that provides a net supply of power to the electricity distribution system is considered to be a benefit. The Proposed Development would similarly make a beneficial contribution to energy security by reducing the dependence on imported fossil fuels.

14.2 Limitations of this Assessment

14.2.1 There are no limitations relating to the socio-economic assessment that affect the robustness of the assessment of the likely significant effects of the Proposed Development.

14.3 Relevant Legislation, Planning Policy, and Technical Guidance

Legislative Context

14.3.1 The application for the Proposed Development is being submitted to the Scottish Government for consideration under section 36 of the Electricity Act 1989 (as amended) given that it would have a generating capacity in excess of 50MW. The Applicant is also seeking a direction under section 57(2) of the Town and Country Planning (Scotland) Act 1997 that planning permission be deemed to be granted for the Proposed Development.

Planning Policy Context

14.3.2 National/regional and district/local planning policies as well as policies in respect of economic development, tourism, and wider social and community effects may have a bearing on the scope of the assessment of socio-economic, tourism and recreation effects.

14.3.3 The Development Plan and other relevant planning policy are discussed within **Chapter 5: Legislative and Policy Overview**. The following documents were examined for their relevance to this socio-economic, tourism and recreation assessment of the Proposed Development:

- National Planning Framework (NPF) 3 (2014);
- The Scottish Planning Policy (SPP) (2014);
- The Government Economic Strategy (2011);
- Outer Hebrides Local Development Plan (2018);
- Outer Hebrides Local Development Plan Wind Energy Supplementary Guidance (2018):
- Scotland's Economic Strategy (2011 and 2015);
- A Low Carbon Economic Strategy for Scotland (2010); and
- Scottish Energy Strategy: The Future of Energy in Scotland (2017).

14.3.4 National, regional and local planning policy is supportive of renewable energy development. Local Planning Authorities are required to balance the benefits delivered by renewable energy schemes against any predicted adverse effects.

National Policies

14.3.5 This section provides an overview of national policies of relevance to the Proposed Development. This section also considers national strategies of relevance to this socio-economic assessment.

National Planning Framework 3 (2014)

14.3.6 Scotland's Third National Planning Framework[1] (NPF3 – Scottish Government, 2014) provides a statutory framework around which to orientate Scotland's long-term spatial development. NPF3 represents the spatial expression of the Scottish Government's Economic Strategy and it highlights the spatial planning implications of multiple national policy documents and commitments, including the binding decarbonisation targets enshrined within the Climate Change (Scotland) Act 2009. Further details regarding the NPF3 are set out in **Chapter 5** of this EIA Report.

[1] Available at https://www.gov.scot/publications/national-planning-framework-3/ (accessed 15/01/19).

14.3.7 Paragraph 2.2 of the NPF3 identifies Scotland's key economic sectors as energy; food and drink; life sciences; tourism; financial and business services; universities and the creative industries. Paragraph 2.24 recognises the important role of rural areas in supporting economic sectors including tourism, food and drink and other primary industries. The paragraph notes that *"growth and investment in these sectors relies on the continuing environmental quality of our countryside, infrastructure and the sustainable use of our natural resources"*. At the same time paragraph 2.26 states that *"we do not wish to see development in our rural areas unnecessarily constrained"*.

Scottish Planning Policy (2014)

14.3.8 The Scottish Planning Policy[2] (SPP) sets out the Scottish Government's objectives and expectations for the Scottish Planning System. In doing so the SPP aims to contribute to the achievement of the Scottish Government's overarching purpose of realising sustainable economic growth.

14.3.9 The 'Supporting Business and Employment' Subject Policy within the SPP is of direct relevance to this socio-economic assessment. Under this policy, paragraph 93 of the SPP identifies three key principles for planning. Two of these principles are of relevance to the Proposed Development:

"Promote business and industrial development that increases economic activity while safeguarding and enhancing the natural and built environments as national assets; (and)

Give due weight to net economic benefit of proposed development".

14.3.10 Paragraph 187 states that *'Planning Authorities should support the development of wind farms in locations where the technology can operate efficiently and environmental and cumulative impacts can be satisfactorily addressed. Development plans should provide a clear indication of the potential for development of wind farms of all scales, and should set out the criteria that will be considered in deciding applications for development of wind farms of all scales. The criteria will vary… but are likely to include:*

- *Landscape and visual impact;*
- *Effects on the natural heritage and historic environment;*
- *Contribution of the development to renewable energy generation targets;*
- *Effect on the local and national economy and tourism and recreation interests; and*
- *Benefits and disbenefits for communities.*

The Government Economic Strategy (2011)

14.3.11 The Government Economic Strategy (Scottish Government, 2011) gives clear priority to accelerating economic recovery, with a range of measures to tackle unemployment and promote employability. Actions are focussed on six 'strategic priorities' which will drive sustainable economic growth and develop a more resilient and adaptable economy. These are: Supportive Business Environment; Transition to a Low Carbon Economy; Learning, Skills and Well-being; Infrastructure Development and Place; Effective Government; and Equity.

14.3.12 The *'Transition to a Low Carbon Economy'* priority identifies the excellent opportunities Scotland has to secure investment and jobs from the growing low carbon sector and ensure that the benefits of this transformational change are shared across the economy and communities.

[2] Available at https://www.gov.scot/publications/scottish-planning-policy/ (accessed 15/01/19)

14.3.13 The Scottish Government has confirmed its intention to continue to play a key role in the national and international energy economy and its aim is to become a global leader in developing solutions to the challenge of climate change.

Scotland's Economic Strategy (Scottish Government, 2015)

14.3.14 This document identifies the transition to a low carbon economy, including the deployment of renewable energy technologies, as a *"key aspect"* of the current Economic Strategy for Scotland.

A Low Carbon Economic Strategy for Scotland (Scottish Government, 2010)

14.3.15 This strategy explains how the Scottish Government intends to transition Scotland's current economy towards a low carbon one and explores the predicted socio-economic impacts of this transformation, including on inward investment and employment. Energy generation is identified as a key economic sector where substantial decarbonisation is required in order to meet statutory climate change targets. The document observes that *"onshore wind is still the technology that can make the most immediate positive impact on our low carbon economy"* (paragraph 90) and therefore envisages the continued deployment of onshore wind farms, stating that *"the Scottish Government will continue to encourage large, medium and small scale developments that are sited appropriately"* (paragraph 90).

Scottish Energy Strategy: The Future of Energy in Scotland (December 2017)

14.3.16 The strategy[3] sets out a 2050 vision for energy in Scotland:

'A flourishing, competitive local and national energy sector, delivering secure, affordable clean energy for Scotland's households, communities and businesses.'

14.3.17 The strategy sets out two new targets which are:

- *'The equivalent of 50% of the energy for Scotland's heat, transport and electricity consumption to be supplied from renewable sources;*
- *An increase by 30% in the productivity of energy use across the Scottish economy.'*

Development Plan Policies

Outer Hebrides Local Development Plan

14.3.18 The Outer Hebrides Local Development Plan (OHLDP) was adopted in November 2018 and is the applicable development plan for the area covering the Development Site. Whilst **Chapter 5** of this EIA Report sets out all the relevant planning policies, the paragraphs below provide an overview of those which are considered relevant to this socio-economic assessment.

Policy EI7 Countryside and Coastal Access

14.3.19 This policy requires that *'development proposals must be located to ensure the Hebridean Way, the Core Path network and established and functional access points to water are kept free of obstruction unless it can be demonstrated that that the path or access point can be maintained or enhance its amenity value; or ensure alternative access provision that is no less attractive and is safe and convenient for public use.'* The policy also requires that where practical *'development proposals should avoid 'other routes' as identified in the Core Paths Plan.'*

[3] Available at: http://www.gov.scot/Resource/0052/00529523.pdff [Accessed 16/01/19].

Policy EI 8: Energy and Heat Resources

14.3.20 This policy states that *'The Comhairle will support proposals that contribute to meeting the targets and objectives of the National Planning Framework 3, the Climate Change Act, and the National Renewables Infrastructure Plan in relation to electricity grid reinforcement, infrastructure and renewable energy generation'* and that

'Development proposals for all scales of onshore wind energy development will be assessed against the Supplementary Guidance for Wind Energy Development.'

14.3.21 It also states:

'Proposals for all other renewable energy projects and oil and gas operations (including land based infrastructure associated with offshore projects) will be required to demonstrate all the following:

- *a) Appropriate location, siting and design including the technical rationale for the choice of site;*
- *b) No significant adverse impact (including cumulative) on: landscape, townscape and visual aspects; natural, built and cultural heritage resources; the water environment; peatlands; aviation, defence and telecommunications transmitting and receiving systems, e.g., broadband; public health and safety, and amenity (including noise); neighbouring land uses, transport management and core paths;*
- *c) Appropriate decommissioning and site reinstatement arrangements;*
- *d) Phasing arrangements, where appropriate; and*
- *e) The contribution towards meeting national energy supply targets and local economic impact.'*

Outer Hebrides Local Development Plan - Supplementary Guidance for Wind Energy Development

14.3.22 This Supplementary Guidance sets out development policies for the assessment of all scales of wind farms and includes policies on economic impacts and benefits and community benefits. An overview of these policies is set out below.

Economic Impacts and Benefits Policy

14.3.23 This policy requires that *'for all wind farm developments, Developers must provide an assessment of net economic impacts.'* The policy also notes that SPP recognises that Planning Authorities in determining planning applications, will consider net economic impact, including *'local and community socio-economic benefits such as employment, associated business and supply chain opportunities'* and that in line with SPP and NPF and also the National Renewables Infrastructure Plan the Comhairle will *'seek to secure positive net economic impact accruing directly within the Outer Hebrides'*.

Community Benefits Policy

14.3.24 This policy requires that:

'Planning applications for wind farms must be accompanied by evidence that that the proposals have been assessed and found to have no unacceptable significant adverse impact on community amenity in relation to the following:

- *Shadow flicker;*
- *Noise;*
- *Electromagnetic Interference;*
- *Commissioning and Decommissioning;*

- *Phasing;*
- *Ancillary Developments and Infrastructure;*
- *Public Access; and*
- *Cumulative impacts of the above, including noise, cumulative development assessment and neighbouring development'.*

14.3.25 The policy also states that in the consideration of wind farm proposals, *'the Comhairle will seek to maintain and improve public access and enjoyment, in line with Local Development Plan Policies EI7 and PD5 in relation to countryside access and open space provision.'*

Technical Guidance

14.3.26 There are no specific guidelines or requirements for socio-economic assessment either set out by the Electricity Works (Environmental Impacts Assessment) (Scotland) Regulations 2017 or in any other statutory or advisory guidance regarding the preparation of EIAs. The method adopted is therefore one of determining the existing circumstances (the baseline) through desk-based analysis, drawing on a range of statistical information and consultations with regional and local representative bodies as well as members of the community during public exhibitions, opinion polls and through various forms of correspondence. In addition, the BiGGAR Economics report 2007 (see **Section 14.5.8**) has been used in the preparation of this Chapter.

14.4 Data Gathering Methodology

Study Area

14.4.1 To identify the key components of the local economy, existing land use, tourism and recreational facilities on Lewis, a desk-based study using publicly available information has been undertaken. The Study Area for tourism and recreation was limited to 10km from the Development Site, with the population and economic baseline focused on the Steornahagh a Tuath, Sgir 'Uige a Gus Ceann a Tuath nan Loch and Loch a Tuath wards within which the Development Site is situated and for Lewis as a whole. For health the Study Area was Lewis as a whole. For employment the Study Area included the Steornahagh a Tuath, Sgir 'Uige a Gus Ceann a Tuath nan Loch and Loch a Tuath wards, Lewis as a whole and where relevant at a national level for Scotland. The land use Study Area is the Development Site.

14.4.2 The data sources that have been used in the preparation of this socio-economic assessment are referenced at **Section 14.19** below.

Desk Study

14.4.3 The assessment includes an extensive review of information sources to establish the baseline conditions and to identify current tourism and recreation businesses and resources as well as tourism and recreational activities in the Study Area. The assessment uses standard socio-economic and demographic data from available datasets, including the 2001 census and the 2011 census where available, NOMIS (the Office for National Statistics website), standard sources of tourist and visitor data found on Visit Scotland's website, and other individual research reports. Conclusions on previous surveys carried out regarding attitudes to wind farms have also been reviewed.

Survey Work

14.4.4 No site-specific survey work has been undertaken by the Applicant for this socio-economic assessment.

14.5 Overall Baseline

Current Baseline

14.5.1 This section sets out the current baseline for this socio-economic assessment and the key receptors against which the Proposed Development has been assessed. These socio-economic receptors are:

- Population;
- Employment and Economy;
- Health;
- Tourism and Recreation; and
- Land Use.

14.5.2 Information is also provided in this baseline section about the renewables industry and public attitudes to wind farms in relation to tourism and recreation.

Renewable Energy Industry

Manufacturing & Supply Chain

14.5.3 There is a large scale wind turbine manufacturing plant located at Machrihanish near Campbeltown. The Wind Towers (Scotland) Ltd facility at Machrihanish currently employs approximately 130 workers. This was taken over by South Korean firm CS Wind but it continues to operate at the Machrihanish site and further investment is planned which may result in further job creation.

14.5.4 There are further wind turbine manufacturing facilities distributed throughout northern Europe.

14.5.5 In addition to this, several leading engineering and energy companies have announced their intention to invest significant funds in deploying large-scale, next generation renewable energy technologies across Scotland, including at Fife Energy Park and Clydeport's Hunterston site.

14.5.6 There are also businesses across Scotland that are involved in developing secondary components for wind turbines, however these components are not required solely for wind turbines. Therefore, it is not possible to identify with any precision, the presence or absence of such businesses on Lewis and whether any such businesses would directly benefit from the Proposed Development.

14.5.7 LWP has a contracting strategy of allowing as many local businesses as possible to compete for construction, or similar contracts. This is a clear direction to any appointed Principal Contractor.

Employment & Investment

14.5.8 In January 2014, Scottish Renewables published a report entitled 'Employment in Renewable Energy in Scotland' by O'Herlihy & Co. which demonstrates that in 2013 there were at least 11,625 FTE posts within Scotland's renewable energy sector. This included 3,397 FTE posts within the onshore wind subsector, which has at least 343 firms operating in it, 103 of which are involved exclusively with onshore wind projects. Scottish Renewables recognises that this study is likely to have underestimated the numbers as it relied on a survey methodology which means that there are likely to be organisations who were not included and who are either directly active in, or supply services to the renewable energy sector in Scotland. Nonetheless, these statistics demonstrate the national and regional employment significance of both the renewables sector generally, and specifically the onshore wind industry.

14.5.9 The renewable UK Onshore Wind: Economic Impacts 2014 report[4] evaluates the economic impacts of the UK onshore wind industry at national, regional and local scales. This report assesses the direct and indirect economic impacts of the commercial onshore wind sector using similar case studies and economic modelling methodologies.

14.5.10 The report concludes that throughout the period between 2012 and 2015, the percentage of expenditure from individual development projects coming into the UK has increased for development and construction phases and that a higher percentage of this is spent within local supply chains, however these trends are not evident for operations and maintenance. This means that projects such as the Proposed Development are now predicted to generate greater positive economic and employment impacts during their construction phase than was calculated using the figures previously contained within the 2012 report.

14.5.11 From a detailed economic analysis of onshore wind case studies, the report concludes that for each 1MW of installed capacity, 69% of total expenditure takes place within the UK. This takes account of the following reported expenditure in the UK: 98% of development; 48% of construction; and 87% of operation and maintenance costs. The report also calculates that the medium-large subsector of the onshore wind market contributes 13,600 jobs and £906 million in gross value added (GVA) to the UK economy.

14.5.12 The Review of the Generation Costs and Deployment Potential of Renewable Energy Technologies in the UK report[5] (DECC, 2011) analyses the deployment potential and generation costs of renewable electricity technologies in the UK up to 2030. It states that onshore wind energy "*still has significant deployment potential of around 17.3GW by 2030*". This report estimates total capital costs for onshore wind farms greater than 5MW to between £1.18m and £1.82m per MW installed, and an operating expenditure of between £30,000/MW/year and £73,000/MW/year (page 21).

14.5.13 A study by Scottish Renewables in March 2012[6] indicated that the 20GW of renewable energy developments located in Scotland have resulted in at least 11,136 Full Time Equivalent Jobs (FTEs) being created, with 2,235 directly related to onshore wind, 3,223 related to the grid connections, with another 1,231 working across other sectors. Scottish Renewables recognises that this study is likely to have underestimated the numbers as the methodology followed did not factor in the "lower tiers of the supply chain" along with "induced jobs in other support services". Therefore, this figure does not include roles in the delivery stage of renewable energy development.

14.5.14 RenewableUK published a report 'Working for a Green Britain and Northern Ireland'[7] in September 2013 which stated that employment in wind, wave and tidal energy sectors now directly employs 18,465 people full time, an increase of 74% since 2010, with the largest increase for offshore wind where the number of direct jobs doubled between 2010 and 2013. The report also showed that 91% of the employees in the UK wind and marine energy industry are UK citizens, while also showing that small and medium enterprises make up the heart of the sector and driving the growth in employment with more than 80% of employers in the sector employing fewer than 250 people with 56% employing fewer than 25 people. The report also predicted that over 70,000 jobs could be created over the next decade. Of the 18,465 people directly employed, 54% were in relation to

[4] https://cdn.ymaws.com/www.renewableuk.com/resource/resmgr/publications/reports/onshore_economic_benefits_re.pdf.
[5] https://www.gov.uk/government/publications/review-of-the-generation-costs-and-deployment-potential-of-renewable-electricity-technologies-in-the-uk-study-report-by-arup (accessed 19/01/19).
[6] http://www.scottishrenewables.com/media/uploads/publications/final_sr_jobs_report_21032012_-web.pdf (accessed 19/01/19).
[7] http://www.renewableuk.com/en/publications/index.cfm/working-green-britain (accessed 19/01/19).

onshore wind with 36% relating to large onshore wind (over 500kW turbines). Scotland accounts for 3,827 jobs, approximately 20%[8] of the sector, which while lower than the total number of direct jobs in England, accounts for a higher proportion of total employment in Scotland (also higher than Wales and Northern Ireland).

Development Site

14.5.15 The Development Site is located approximately 1.5km west of the town of Stornoway, Lewis (see **Figure 1.1 and Figure 1.2**). It is centred at National Grid Reference (NGR) E137149 N933373. The Development Site extends to approximately 1,700ha, although the wind farm infrastructure would occupy only a small part of this (~37ha).

14.5.16 The topography of the Development Site ranges between 50 – 150m Above Ordnance Datum (AOD), with three hillocks within its northern, central and southern areas. It is dominated by blanket bog and associated mosses and heather, though there are some areas of woodland present. There are also a large number of water bodies on the Development Site, both standing and flowing, none of which have any conservation designations.

14.5.17 Access to the Development Site is via the A859. Pentland Road runs through the northern part of the Development Site, and partly along the western boundary.

Population

14.5.18 The most recent mid-year population estimates (2017) for the Outer Hebrides gives a population of 26,950, which is an increase of 0.2% (50 persons) from the mid 2016 to mid 2017. This increase is attributed to the positive net migration (155 persons) which has counteracted the negative 'natural change'. Deaths (at 351 persons) continued to exceed births (240 persons) over the period.

14.5.19 The median age in the islands was estimated to be 48 years (the Scottish average is 42 years) in June 2017. Over the 10 year period between 2007 and 2017 there was a decrease of 160 persons. In 2017 the median age in the Outer Hebrides was estimated to be 47 years for males and 49[9] years for females.

14.5.20 Census data from 2011 showed that the resident population of the Outer Hebrides was 27,684, comparing to 26,502 in 2001. Over the ten year period between these two censuses there was a population increase of 4.5% in the Outer Hebrides, which was the 18th highest in Scotland. Since 1901 the population of the Outer Hebrides has decreased by 40%. The population of the Outer Hebrides is forecast to decrease to 25,616 by 2026 and 23,127 by 2041.

14.5.21 Lewis and Harris is the most populous of the Outer Hebrides, and had just over 20,500 residents in 2011, a rise of 5.6% from the 2001 census total of 19,918. Stornoway is the main town of the island, and the civil parish of Stornoway, including the town and various nearby villages, has a population of about 12,000.

14.5.22 National Records of Scotland published 'Life Expectancy for Administrative Areas within Scotland 2015-17[10]' in December 2018. This publication includes life expectancy estimates for Council areas and shows that there has been a small decrease in life expectancy in Scotland for both females and males. During the period 2015-17 there was an increase of 3.6 years in life expectancy for males in the Outer Hebrides, at birth this expectancy being 76.8 years for males which is ranked 22 out of the 32 Council areas. For females in the Outer Hebrides life expectancy is now 82.8 years which is

[8] All figures from http://www.renewableuk.com/en/publications/index.cfm/working-green-britain (accessed 19/01/19).
[9] https://www.cne-siar.gov.uk/strategy-performance-and-research/outer-hebrides-factfile/population/overview/ (Accessed 15/01/19).
[10] https://www.nrscotland.gov.uk/statistics-and-data/statistics/statistics-by-theme/life-expectancy/life-expectancy-in-scottish-areas/life-expectancy-for-administrative-areas-within-scotland-2015-2017 (Accessed 15/01/19).

ranked 4th out of all authorities (the average in Scotland is 81.1[11]). Females in the Outer Hebrides consistently have one of the highest life expectancies in all Council areas whilst male life expectancy is one of the lowest in Scotland. The Outer Hebrides has the largest difference in Scotland in life expectancy between males and females, the latter being 6 years higher.

Health

14.5.23 Scotland's Public Health Observatory Health and Wellbeing profiles[12] for 2015 provides an overview of health in Scotland, highlighting health and social inequalities. Some key findings from this report are:

- Life expectancy – overall life expectancy in Scotland for both men and women continues to rise, although it still lags behind rest of the UK and most western European nations. The life expectancy gap between men and women has narrowed over time, but women are expected to live at least 4 years longer than men. In the last decade life expectancy for men increased from 73.3 years to 76.6 years and for women from 78.8 years to 80.8 years;
- Mortality – all cause mortality rates for young working age adults (people aged 15-44) have declined over the ten year period 2002-04 to 2011-13 (119 down to 105 per 100,000 population), although rates remain relatively high compared to Scotland's Western European neighbours; and
- Child poverty – In August 2012, 15.3% of children in Scotland were living in poverty. This is a decrease compared to the 16.5% reported for 2009, the first year of these health and wellbeing profiles.

14.5.24 These profiles show Lewis includes areas with the lowest life expectancy for males but have areas with higher life expectancy for females. Lewis includes an area with the highest rates of mortality amongst 15-44 year olds. However, the Development Site is located in an area where the all-cause mortality rate is lower. There are no areas on Lewis that have the highest percentage of children living in poverty.

14.5.25 As well as the wider Scotland profile, there is also one for the Outer Hebrides. This includes a range of health indicators on life expectancy, behaviours, ill health and injury, social care and housing, education, economy, crime, environment, women's and children's health and immunisations. The overall picture is mixed but none of the indicators are categorised in the worst (compared to the rest of Scotland); and in many instances they are better than the national average, for example early deaths from cancer and children living in poverty. However, there are some indicators where the measure is higher than the Scotland average, for example the number of people aged 65 and over with high levels of care needs.

14.5.26 NOMIS statistics[13] show that for the period October 2017-September 2018 there were 700 people of working age on long term sick in the Outer Hebrides, which equates to 24.4% of those of working age, which is lower than the figure for Scotland as a whole of 26.5%, but higher than 22.4% for Great Britain.

14.5.27 There are three hospitals in the Outer Hebrides:

- Western Isles Hospital, Stornoway;
- Uist and Barra Hospital, Benbecula and

[11] All figures from Socio-Economic Update no 39 available at: https://www.cne-siar.gov.uk/media/13066/se-39.pdf (Accessed 15 01 19).
[12] https://www.scotpho.org.uk/opt/Reports/ScotPHO-Health-Wellbeing-Report-2015-150731-web.pdf (Accessed 25/01/19).
[13] https://www.nomisweb.co.uk/reports/lmp/la/1946157417/report.aspx (Accessed 25/01/19).

- St Brendan's Hospital, Barra.

14.5.28 There are also a number of GP surgeries dotted throughout the Outer Hebrides, with three on Lewis that each have six GP's. There is also the Western Isles dental centre in Stornoway.

14.5.29 There is no indication that any of these medical facilities are currently under-resourced or under significant pressure.

Employment and Economy

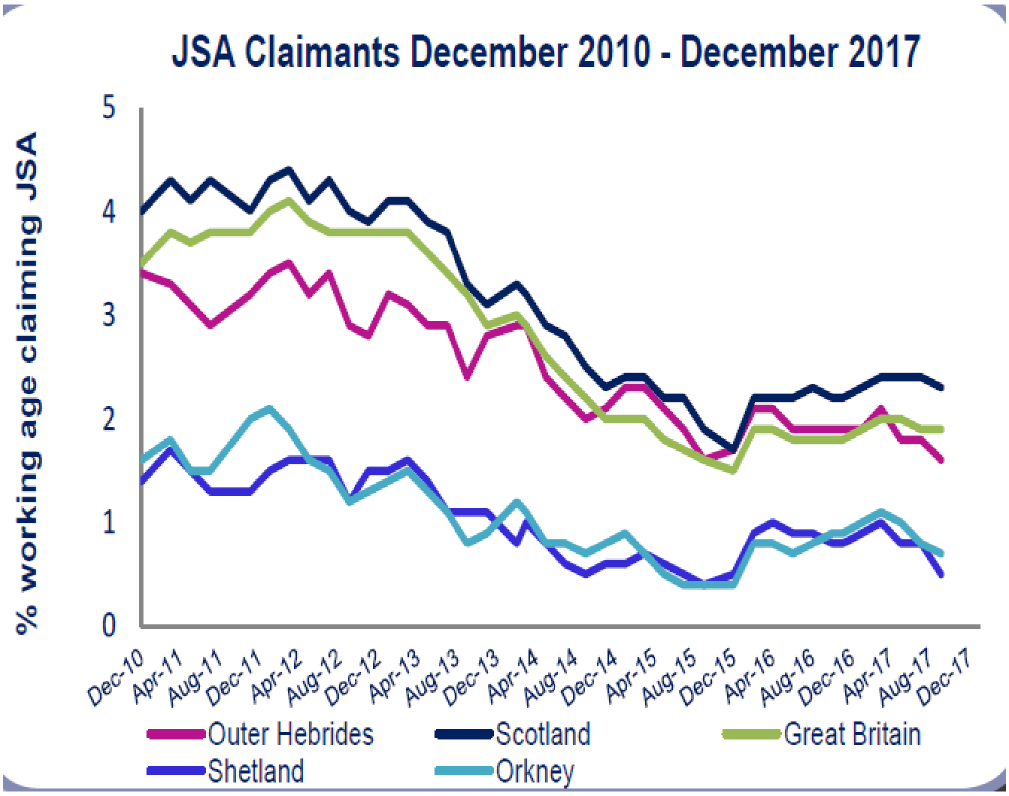
14.5.30 There is no economic information available at the ward level and so information has been presented here for Lewis as a whole with reference to the wider Outer Hebrides and national statistics for Scotland where appropriate.

14.5.31 There are different factors governing the supply and demand of labour in the economy including unemployment, skills and wages. The supply of appropriate labour to support the construction and operation of the Proposed Development would be a key factor in maximising benefits in the local economy.

14.5.32 The latest NOMIS release shows that employment rates in the Outer Hebrides remain stable. The employment rate in the Outer Hebrides was 80.4% from July 2017 to June 2018 which was higher than the equivalent figures of 74.5% and 75% for Scotland and Great Britain respectively. The self-employment rate in the islands has risen slightly at 10.6% in the Outer Hebrides and was 8.2% in Scotland and 10.6% in Great Britain. The percentage of males in employment (81.8%) was slightly higher than that for females (81.4%) which reflects trends for Scotland and Great Britain as a whole.

14.5.33 With regards to unemployment, the job seekers allowance (JSA) rate (as shown in **Figure 14.1** below) remains low in the Outer Hebrides and this varies greatly between men and women. The rate for men is 2.5% while the rate for women is 0.7%. NOMIS statistics for the period July 2017 – June 2018 show that there was a total of 2,800 people economically inactive which equates to 18.4% of the population, which is lower than the equivalent figures of 22.2% for Scotland and 21.6% for Great Britain. There were also 1,000 workless households in the Outer Hebrides.

Figure 14.1 Job Seekers Allowance Claimants December 2010-2017



Source: Socio-Economic Update no 39 available at: https://www.cne-siar.gov.uk/media/13066/se-39.pdf

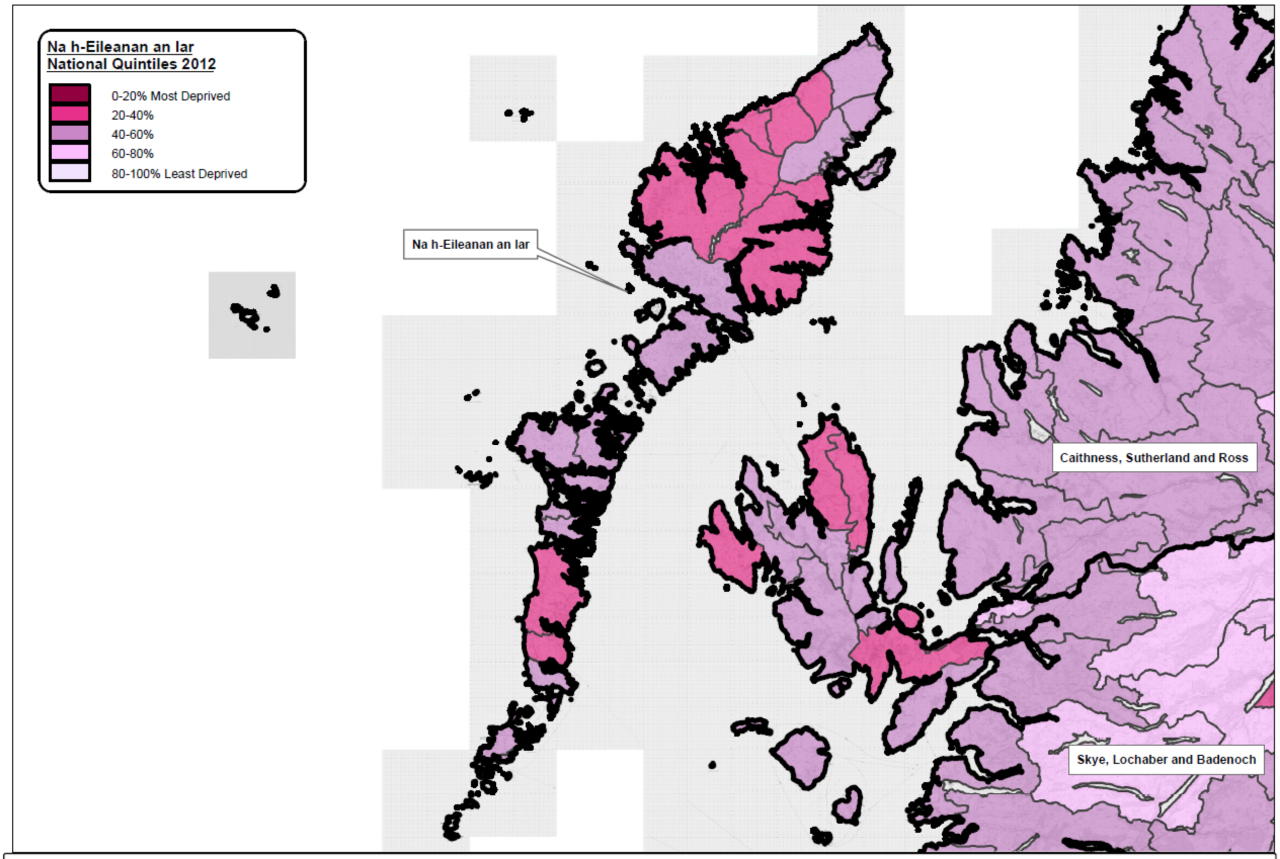
14.5.34 The level of earnings is an important indicator of the general health of the local economy but also reflects economic activity in the area. In general, higher earnings indicate a prosperous economy comprised of sectors that pay well, whilst low earnings indicate the opposite. Gross weekly pay (median earnings for employees living in the area) in the Outer Hebrides is £476.70 which is the lowest in Scotland. The average for Scotland is £562.70 and for Great Britain £571.10. For the Orkney and Shetland Islands, the gross weekly pay was significantly higher than the Outer Hebrides at £636.80 and £666.90 respectively.

14.5.35 Gross weekly earnings for full-time employees in the public sector increased by 2.8% over the year to £627.90 in 2018, while gross median weekly earnings for full-time employees in the private sector increased by 4% over the year to £528.40[14].

14.5.36 The Scottish Index of Multiple Deprivation (SIMD) identifies small area concentrations of multiple deprivation across all of Scotland. 38 indicators of deprivation are used within SIMD 2012, looking at seven dimensions which are: Income; Employment; Health; Education; Housing; Access to Services; and Crime. The SIMD is separated out into data zones which are able to identify small areas of deprivation, with the level of deprivation increasing with the SIMD score.

[14] All figures from Socio-Economic Update no 39 available at: https://www.cne-siar.gov.uk/media/13066/se-39.pdf (accessed 15 01 19).

Figure 14.2 2012 SIMD CNeS



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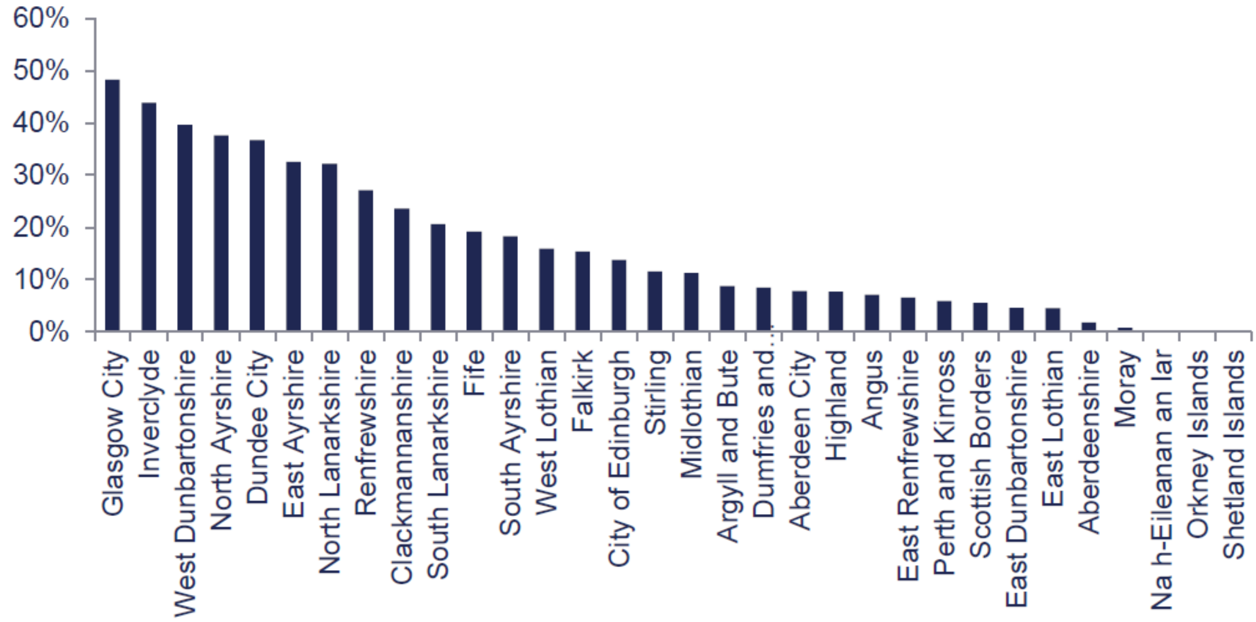
Source: https://www2.gov.scot/Topics/Statistics/SIMD/DataAnalysis/SPconstituencyprofile/Nah-Eileanan-an-Iar

14.5.37 As shown in **Figure 14.2** above for the 2012 SIMD, none of the 976 datazones (DZ) in the 15% most deprived datazones in Scotland were found in the Comhairle nan Eilean Siar Council (CnES or Council) area. This is the same as in the three previous versions of SIMD. Eight (0.4%) of the 1,626 datazones in the 35% most deprived in Scotland are found in Na h-Eileanan an Iar in SIMD 2012.

14.5.38 In SIMD 2012, none of CnES 36 datazones were found in the 15% most deprived in Scotland. This is the same as in the three previous versions of SIMD. Eight (22%) of its datazones are in the 35% most deprived in SIMD 2012. CnES is one of four constituencies in the Highlands and Islands region which have no datazones within Scotland's most deprived 15% in SIMD 2012 (the others are Moray, Orkney Islands and Shetland Islands).

14.5.39 The SIMD is updated approximately every 4 years. Data from the 2016 SIMD (as shown in **Table 14.1** below) shows that for the local share of DZs in each Council area that are found in the 20% most deprived DZs in Scotland, CnES is the 3rd lowest, with only the Orkney and Shetland Islands lower.

Table 14.1 Local Share of Data Zones in Each Council Area in the 20% Most Deprived Data Zones



Source: https://www2.gov.scot/Resource/0051/00510728.pdfthelocal share

14.5.40 One of the factors contributing to the SIMD is educational attainment. Data from the NOMIS[15] indicates that 6.7% of those aged 16 and above in Lewis have no qualifications, a lower level than the national average of 8.7% and the average for Great Britain of 6.6%. 89.5% of the population aged 16 and over has qualifications at NVQ1 and above, higher than the figures of 84.9 and 85.4 for Scotland and Great Britain respectively.

14.5.41 **Table 14.2** below indicates that the Lewis has a relatively diverse economic base, not dissimilar to that of Scotland as a whole, with strong health and social care, retail, construction, education and manufacturing sectors. **Table 14.2** also highlights the presence of localised high concentrations of human health, construction and retail, mirroring national trends.

[15] https://www.nomisweb.co.uk/reports/lmp/la/1946157417/report.aspx?town=stornoway (accessed 15 01 19).

Table 14.2 Employment by Industry (2007 Electoral Ward and 2011 Census)

% All in Employment Who Work In	Steornahagh a Tuath Ward	Sgir 'Uige a gus Ceann a Tuath nan Loch Ward	Loch a Tuath	Comhairle nan Eilean Siar	Scotland
Agriculture, forestry and fishing (a)	6.3	6.9	1.8	4.6	2
Mining and quarrying (b)	1.6	1.7	2.4	1.6	1.4
Manufacturing (c)	6	6.1	4.9	5.3	7.7
Electricity gas steam and air conditioning (d)	0.32	0.37	0.5	0.4	0.8
Water supply, sewage waste management and remediation activities (e)	1.1	1.1	1.1	0.9	0.8
Construction (f)	12.5	12.9	11.5	11.4	8.0
Wholesale and retail trade, including repair of motor vehicles and motorcycles (g)	10.5	10.7	12	11.4	15
Transport and storage (h)	6.5	6.8	7.5	7.5	5.0
Accommodation and food service activities (i)	4.2	4.7	3.7	6.1	6.3
Information and communication (j)	2.2	2.4	2.2	2.4	2.7
Financial and insurance activities (k)	0.5	0.5	0.8	0.8	4.5
Real estate activities (l)	0.5	0.5	0.8	0.9	1.2
Professional scientific and technical activities (m)	3.3	3.6	3.3	3.6	5.2
Administrative and support service activities (n)	7.7	7.9	3.6	3	4.3
Public administration and defence - compulsory social security (o)	7.8	7.9	7.5	7.8	7.0
Education (p)	8.9	8.2	11.8	9.8	8.4
Human health and social work activities (q)	17.8	17.6	20.4	17.8	15
Other industries (r, s, t, u)	4.2	4.4	3.8	3.8	4.9

Source: http://www.scotlandscensus.gov.uk/ods-web/standard-outputs.html

14.5.42 Recent statistics from NOMIS show that the largest employment sector on Lewis is human health and social work activities (2,250 persons) followed by wholesale and retail trades (1,500 persons) and then accommodation and food service activities (800 persons) and then construction (700 persons). The percentages of people employed in these industries is similar to that for Scotland and Great Britain as a whole.

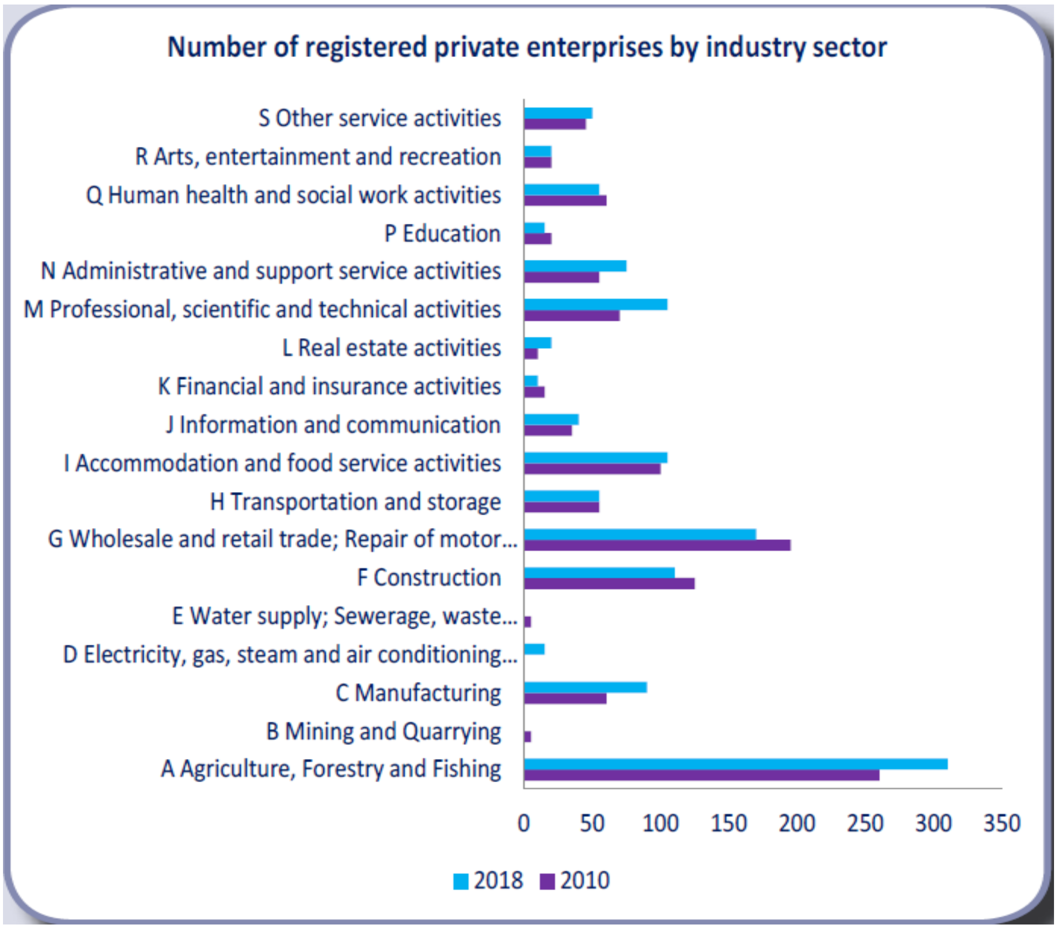
14.5.43 In November 2018, the Scottish Government released a publication on Businesses in Scotland 2018[16]. This publication provides information on the number of enterprises operating in Scotland. For the Outer Hebrides in 2018 there were 1,255 enterprises with a total employment of 7,160 and total turnover of £745 million pounds, which is a 3% increase in turnover from the previous year. In the Outer Hebrides (as illustrated in **Figure 14.3** below) the largest sectors were agriculture,

[16] Available at https://www2.gov.scot/Topics/Statistics/Browse/Business/Corporate (Accessed 16/01/19).

forestry and fishing and 14% employment was in wholesale and the retail trade. This is followed by the construction industry (9%), professional, scientific and technical activities (8%) and accommodation and food activities (8%).

14.5.44 The Outer Hebrides had a 2.5% increase in the number of registered enterprises from 1,225 in 2017 to 1,255 in 2018.

Figure 14.3 Number of Registered Private Enterprises by Industry Sector in the Outer Hebrides



Source: Socio-Economic Update no 39 available at: https://www.cne-siar.gov.uk/media/13066/se-39.pdf

14.5.45 Fishing is an important industry for the Outer Hebrides. The Scottish Sea Fisheries Statistics 2017 publication[17] provides data on the Scottish fleet, landings and employment. Employment in fishing accounts for a higher percentage of employment in the Outer Hebrides, where it exceeds 2%, than it does nationally. Employment in fishing is highest in the Shetland Islands and second highest in the Outer Hebrides. However, there was a 6% decrease in the total number employed in fishing in the Outer Hebrides than previous years.

14.5.46 For the Highlands and Islands (including the Outer Hebrides) it is estimated that 600 jobs are supported by the renewables sector, giving an estimated GVA of £15m. The Scottish Government estimate that at the national level, the low carbon employment sector accounted for 44,800 jobs in 2013 of which 5,400 were within the onshore wind energy subsector (Scottish Government, 2015). These statistics demonstrate the importance of the renewable energy sector to the regional and national economy.

[17] Available at https://www.gov.scot/publications/scottish-sea-fisheries-statistics-2017/ (accessed 16/01/19).

14.5.47 In 2016, GVA in the energy sector in Scotland amounted to £12.9 billion, representing a £1.6 billion (or 11.2%) decrease on 2015; this fall is as a result of the decline in the oil price.

Tourism and Recreation

Tourism - Economics

14.5.48 The Scottish Government's Annual Business Statistics report for 2016[18] (the latest available edition) shows that there was an 8.4% growth in sustainable tourism. Turnover in the tourism-related industries sector amounted to £7.1 billion (up £401 million or 6.0% on 2015) and GVA amounted to £3.9 billion (up £300 million or 8.4% on 2015). The turnover has grown steadily from 2012 where it was £6.37 billion. This report also highlights that in 2016, turnover in the tourism-related industries sector GVA were the City of Edinburgh (19.2% of Scotland's tourism-related industries GVA), Glasgow City (11.5%) and Highland (6.8%). GVA added for CnES in 2016 was £17.4m which was lower than the previous figures for 2015 and 2016 (£39.9m and £25.7m respectively).

14.5.49 This report shows that restaurants and mobile food service activities was the most valuable sub-sector with GVA at £1,390m, closely followed by hotels at £1,332m. Beverage serving activities was next with GVA of £618m, which as a slight decrease on the equivalent 2008 figure.

14.5.50 The total number of visits to the Outer Hebrides in 2017 was 218,590, of which the majority (148,641) were for leisure visits. The total average spend per person was £428.23. The total overall value of visitor spend on the Outer Hebrides was £65 million, with the largest proportion of this (£51.1 million) came from leisure visitors. Overall, the total value of visitors to the Outer Hebrides economy has increased from £53.5 million in 2013 to £65 million in 2017[19].

14.5.51 2018 statistics[20] from Visit Scotland show that overnight tourism trips were 2.511m, down from 2.974m in 2016 and 3.072m in 2016. This is a 15.6% decrease from 2017 and 18.3% from 2016. The associated spend from domestic overnight trips was also down from £773m in 2016, to £655m in 2018, a 10.6% decrease. However, international tourist trips have been significantly increasing, with a 46.5% increase from 2016 (0.720m in 2016 up to 1.055m in 2018) and 17% increase in associated spend. Whilst the number of tourism day trips decreased slightly, spend from these was up by 26.4% from 2016.

14.5.52 Tourism is one of the key industries and growth sectors for the Outer Hebrides. Tourism generates £53m in economic value for the islands and sustains around 1,000 FTE jobs. There are 219,000[21] visitors per year to the Outer Hebrides.

Tourism – Visitor Statistics and Attractions

14.5.53 The 2017 Outer Hebrides visitor report[22] provides an overview of visitor volume and value. This report highlights that almost three quarters of visitors to the Outer Hebrides reported that they visited Lewis during their trip. The majority of visitors to Lewis stayed overnight and for an average of 3.9 nights. Self-catering accommodation and hotels were the most often used types of accommodation for overnight visitors, followed by B&B's and staying with friends/family.

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[18] Available at https://www2.gov.scot/Resource/0053/00537061.pdf (accessed 16/01/19).

[19] All figures from https://www.visitscotland.org/binaries/content/assets/dot-org/pdf/research-papers/outer-hebrides-report---may-18.pdf (Accessed 06/02/19).

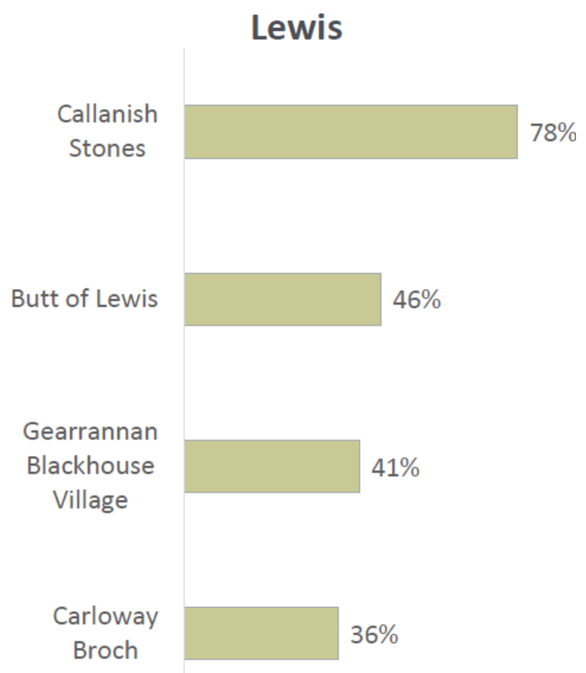
[20] https://www.visitscotland.org/binaries/content/assets/dot-org/pdf/research-papers-2/2018-q2-stats-summary.pdf (accessed 18/01/19).

[21] Tourism Outer Hebrides 2020.

[22] Available at https://www.visitscotland.org/binaries/content/assets/dot-org/pdf/research-papers/outer-hebrides-report---may-18.pdf (accessed 16/01/19).

14.5.54 This visitor report also highlights the top attractions visited for leisure visitors on Lewis as shown in **Figure 14.4** below. Callanish stones was the most popular visitor attraction with 78% of tourist visiting this, followed by Butt of Lewis and Gearrannan Blackhouse Village.

Figure 14.4 Top Attractions Visited on Lewis



Source: 2017 Outer Hebrides Visitor Report.

14.5.55 In 2016, the most popular visitor attractions in the Outer Hebrides were:

- An Lanntair – 223,684 visitors;
- Calanais Visitor Centre – 47,964 visitors;
- Gearrannan Blackhouse Village – 27,398 visitors;
- Taigh Chearsabhagh Museum Arts Centre – 26,485 visitors;
- Balnarald Nature Reserve – 14,700[23] visitors.

14.5.56 There are a variety of museums, arts centres and parks on Lewis including An Lanntair Art Centre, Lews Castle Museum and Archive for the Outer Hebrides, Leathad Ard Garden which are popular with visitors. There is also the popular Bird of Prey trail[24] which is a self-guided journey through the Outer Hebrides and links some of the best places in Scotland to watch birds of prey in a spectacular landscape. The route goes from Barra in the south to Ness at the northern tip of Lewis.

14.5.57 Tourism Outer Hebrides (TOH) 2020 was launched in April 2014 and this sets out the strategic framework for growth on the Outer Hebrides and is the local industry response to the national strategy Tourism Scotland 2020. The TOH 2020 framework[25] sets out the Vision, Mission and Aim for growing tourism on the islands and the means by which this will be achieved. The TOH2020 leadership group comprises Outer Hebrides Tourism, Highlands and Islands Enterprise, CnES and

[23] All figures from https://www.cne-siar.gov.uk/media/11230/fact-card-2018.pdf (Accessed 25/01/19).

[24] Available at: https://www.visitouterhebrides.co.uk/dbimgs/1510_Bird%20of%20Prey%20Trail%20Download.pdf (accessed 18/01/19).

[25] Available at: https://www.visitouterhebrides.co.uk/dbimgs/TH2020%20Strategy%20-%20Final%20-%20Aug%202015(1).pdf (accessed 16/01/19).

Visit Scotland. The framework aims to grow tourism in the Outer Hebrides from £53m to £74m by 2020 by increasing transport capacity/integration, lengthening the season, offering additional authentic experiences and appealing to new markets. The framework highlights that for the Outer Hebrides Islands in 2012-13 there were 218,000 visitors per annum worth an estimated £50m to the area's economy.

Recreational and Tourist Destinations within 35km of the Development Site

14.5.58 **Figure 6.17** shows tourist attractions and recreational routes within 35km radius of the Development Site. These include:

- An Cliseam (Clisham) (highest summit within the South Lewis, Harris and North Uist NSA).

14.5.59 **Figure 6.18** shows tourist attractions and recreational routes within 15km. These include:

- Stornoway Golf Club / Lewis Castle and Lady Lever Park Garden and Designed Landscape (GDL);
- Lewis War Memorial;
- Standing Stones of Calanais (Callanish);
- Tiupman Head (Rubha an T-siumpain); and
- Iolaire Memorial.

Recreation

14.5.60 Lewis is a popular place for a number of recreational pursuits including walking, cycling, horse riding and a variety of other outdoor activities such as golf, fishing and water sports.

14.5.61 The Development Site is subject to the 'right to roam' under the Land Reform (Scotland) Act 2003 such that access for recreation is permitted over the Development Site. However, due to the terrain and land conditions, there is little public access, and there are few walking routes that exist across the Development Site. The principal recreational activity undertaken directly on the Development Site is angling. There is also very limited recreational walking undertaken within the Development Site via a path which was constructed alongside the River Creed, however this is primarily used by anglers for access to the River Creed with very limited use by others. Further information on angling which is undertaken directly within the Development Site is set out in the Land Use section below.

14.5.62 The Outer Hebrides has some of the finest walking experiences in Europe. The Hebridean Way is an important walking route and offers keen hikers a unique opportunity to walk the length of this spectacular archipelago. The walking route will pass through the centre of the Development Site, and at its closets point would be approximately 142m from the closest turbine. Over the course of 156 miles (252km) the route visits 10 islands, crosses 6 causeways and includes two stunning ferry journeys. The Hebridean Way cycling route follows the National Cycle Network 780, following both main and quiet roads, whilst the Hebridean Way walking route has a combination of purpose built sections, existing footpaths, peat tracks, and quiet roads.

Recreational Routes and Paths

14.5.63 The landscape and visual impact assessment in **Chapter 6** has considered the potential visual effects likely to be experienced by people (walkers / cyclists / horse riders / and others) on recreational routes within the Study Area defined and referred to in **Chapter 6**. Those routes have been based on Scotland's Great Trails and the National Cycle Network (NCR) (assessed within the 35km Study Area) and the Core Path Network (assessed within the 15km Study Area) as set out in

Chapter 6. In addition, any recorded Scottish Hill Tracks and Heritage Paths promoted by Scotways have also been included.

14.5.64 The following national level recreational routes have been considered in **Chapter 6**:

- Sustrans Cycle Route (NCR) 780;
- Hebridean Way; and
- Timeless Way.

14.5.65 The following local recreational routes (Core Paths) within 15km of the Proposed Development have been considered in **Chapter 6**:

- Core Path 6: Lewis Castle Grounds Paths;
- Core Path 3: Na Gearrannan to Bragar Coastal Path: and
- Core Path 4: Newmarket Gateway All Abilities Path.

Public Attitude Surveys to Wind Farms

14.5.66 There have been a number of studies undertaken over the years to assess public attitudes to wind farms in relation to tourism and recreation. A selection of the studies undertaken are outlined below with some commentary provided on the key findings from these studies.

University of West England Research

14.5.67 Professor Aitchison of the University of the West of England undertook research to provide information for a public inquiry for a proposed wind farm development at Fullabrook, North Devon in late 2006/January 2007[26] (Aitchinson, 2007). Part of this research involved the interviewing of 379 visitors to areas around two wind farms in Cornwall and two in mid-Wales. 87% of the people interviewed considered that the development of a wind farm would neither encourage nor discourage them from visiting the area. Of the remaining 13%, just over half thought that a wind farm would encourage them to visit an area. The survey also found a broad support for renewable energy schemes in general.

Moffat Centre Research

14.5.68 In 2007, the Moffat Centre[27] undertook a study of the economic impact of wind farms on the Scottish economy, the objective being to provide guidance on assessing the economic impact of wind farm developments and related infrastructure on tourism. Scottish tourism depends heavily on the country's landscape, with 92% of visitors stating that scenery was important in their choice of Scotland as a holiday destination. As manmade structures such as pylons and wind turbines may affect the attractiveness of a landscape this could result in a reduction in prices for tourism services or reduced numbers of tourists, leading to a loss of income and jobs.

14.5.69 Part of the research involved interviewing 380 tourists at locations that maximised the likelihood that respondents would have seen a wind farm during their visit. This found that 39% of respondents were positive about wind farms, 36% had no opinion either way, and 25% were negative. Importantly, respondents that had seen a wind farm were less hostile than those who had not. The results confirm that a minority (20% to 30%) of tourists preferred landscapes without wind

[26] Fullabrook Wind Farm Public Inquiry: research by University of West England, Prof C Aitchinson, January 2007.
[27] http://www.scotland.gov.uk/Publications/2008/03/07113554/0 (accessed 16/02/15).

farms. However, of these, only a very small group were so negative that it would affect their intentions about revisiting Scotland.

14.5.70 In general, the research found that the negative impact of wind farms on tourism at a national level (Scotland) was small, and it was concluded that even large sites such as the Dalswinton Wind Farm in Dumfries and Galloway have minimal impact on tourism.

BiGGAR Economics (2007) Review of Evidence on the Impact of Wind Farms on Tourism and Recreation

14.5.71 This report[28] found that the key drivers of tourism were either major geopolitical events or more regional/local factors, with wind farms not considered to have an impact on tourism trends.

14.5.72 Results from the surveys reviewed by BiGGAR Economics were inconclusive. Some suggested that a minority of visitors may be less likely to return to areas where wind farms are developed. Other surveys suggesting a positive response to wind farm development, with wind farms even becoming a tourist attraction in their own right. The report noted David Stewart Associates carried out research with a holiday centre in Kerrier District Cornwall, 2km from the Goonhilly Wind Farm within an area of outstanding natural beauty (AONB). The report stated that the holiday centre had over 500 units of accommodation and that each year, a questionnaire was given out for visitor comments on the park and its surroundings. Just under 1,400 questionnaires were received in 1995 and the report noted that the same exercise has been carried out each year since, with the wind farm not raised in any of the responses.

14.5.73 The report stated that *"There is no case study evidence that wind farm developments have a negative impact on tourism"*.

Department of Energy and Climate Renewable Energy Awareness and Attitudes Research

14.5.74 In 2009, the Department of Energy and Climate Change (DECC) commissioned independent research by GfK Social Research[29] to explore public awareness and attitudes towards renewable energy in Great Britain (DECC, 2009). The survey results show that public support for renewables remains high, with 85% of the general public supporting the use of renewable energy, and a high level of general public support (78%) for the Government policy at the time, of generating 10% of electricity from renewable energy by 2010.

14.5.75 The survey found that 81% of the general public are in favour of the use of wind power, and 62% would be happy to live within 5km (3 miles) of a wind power development. Those influenced by living near to a renewable energy development were more likely to agree with this statement compared with those who did not (79% compared to 58%).

Survation Energy Poll 27/10/2013 Prepared on Behalf of The Mail on Sunday

14.5.76 An opinion poll commissioned by the Mail on Sunday[30] found that 70.1% of people surveyed would be happy to have a wind farm built in their local area, with 68.1% stating they would prefer to live near a wind development than a fracking plant. This increased when looking at the regional view of Scotland with 70.6% of people surveyed in favour of wind development.

14.5.77 This view was represented across the age groups surveyed with 81.5% of people aged 18-34, 68.5% of people aged 35-54 and 62.6% of people 55 and over happy to have wind farms in their local area. Support in favour of wind farms was also represented across the political spectrum with those

[28] http://www.eastriding.gov.uk/padocs/JAN2013/C09B1330BB5811DBB1910007E9D49360.pdf (accessed 16/01/19).
[29] http://nottfoe.gn.apc.org/0911DECC_renewableresearchmgmtsummary.pdf (accessed 17/01/19).
[30] http://survation.com/wp-content/uploads/2013/10/MailEnergyFinal.pdf (accessed 17/01/19).

intending to vote: Conservative (60.8% in favour), Labour (74.6 % in favour) and Liberal Democrat (81.1% in favour).

Wind Farm Consumer Research, Visit Scotland, 2012

14.5.78 In order to inform its policy, Visit Scotland commissioned a study by Omnibus in 2011[31] to learn more about consumer attitudes to wind farms and their effect on tourism. The study found that the presence of a wind farm would have little impact on a decision to holiday in Scotland.

14.5.79 The Omnibus study incorporated the views of some 3,000 interviewees with 83% of Scotland respondents stating the presence of a wind farm would not affect their decision to holiday in the UK. Additionally the majority (80%) of Scotland respondents were neutral or disagreed that wind farms spoil the look of the Scottish countryside.

14.5.80 The research also demonstrated that almost half of those surveyed would be interested in visiting a wind farm development if it included a visitor centre.

Public Attitudes Tracking Surveys, Department of Energy and Climate Change (DECC), 2012 and 2018

14.5.81 In 2012, DECC set up a tracking survey[32] to monitor and understand public attitudes to DECC's main business priorities. The survey began in March 2012 and runs four times a year.

14.5.82 The seventh wave of data was collected between 25 and 29 September 2013 with a representative sample of 2,103 households in the UK using face-to-face in-home interviews. Three-quarters of people (76%) continue to support the use of renewable energy sources, similar to the September 2012 figure of 79%. Support for on-shore wind was 66%, which has been the average level of support through waves 1 to 7 of the survey.

14.5.83 The 25th wave of data was published in April 2018[33]. This data highlights that there are growing levels of concern about the UK's future energy security and that this was most notable for 'the UK becoming too dependent on energy from other countries' (72% concerned at wave 25, compared with 66% at wave 21), and 'the UK not investing fast enough in alternative sources of energy (71% at wave 25, compared with 66% at wave 21).

14.5.84 The data also highlights that support for the use of renewable energy has reached a peak of 85% at wave 25, an increase from 79% at wave 24. Opposition to renewable energy remained very low at 3%, with only 1% strongly opposed.

14.5.85 Levels of concern over climate change has increased. Almost three quarters of respondents are concerned, and respondents were more likely to see climate change as a result of human activity rather than natural process.

Land Use

14.5.86 The Development Site is owned by the Stornoway Trust and is primarily used for grazing, forestry, angling and peat cutting. In addition, the former Bardon Quarry, which is now used as the Bennadrove Landfill site and recycling point, is located in the northern section of the Development Site, close to Loch Àirigh na Lìc.

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[31] http://www.visitscotland.org/pdf/Windfarm%20Consumer%20Research%20final_docUpdatedx.pdf (accessed 17/01/19).

[32] https://www.gov.uk/government/statistics/public-attitudes-tracking-survey-wave-10 (accessed 17/01/19).

[33] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/702640/Wave_25_Summary_Report.pdf (accessed 25/02/19).

14.5.87 The Stornoway Trust is a community owned charitable trust established in 1923, with responsibility for an area covering ~ 28,000ha. The population within the Stornoway Trust landholding is approximately 12,000, with 45 crofting townships and ~ 1,347 crofters within the population.

14.5.88 The Stornoway Trust has been a long-standing supporter of the development of a renewable energy industry in the Outer Hebrides and over the past ten years has explored a range of options to stimulate renewable energy projects on its land. The Development Site has consent for 36 turbines under the terms of the Consented Development (**Appendix 1B, 1C and 1D**).

14.5.89 The River Creed Basin is located within the centre of the Development Site and is an important river system for both salmon and sea trout. The river basin is managed by the Stornoway Angling Association (SAA). In addition to the River Creed, freshwater fishing also takes place on the Laxdale river system, which is actively fished for both salmon and sea trout. The Laxdale river system is located on the northern periphery of the Development Site. Active fishing grounds include bank fishing on Loch Garbhaig (which supplies a feeder stream which enters into the River Laxdale) as well as several miles of double bank fishing on the River Laxdale, a small proportion of which is located within the Development Site. The Laxdale river system is managed by the Fideach Angling Club, which has acquired a lease in relation to the River Laxdale as well as the Blackwater estuary and rivers.

14.5.90 The socio-economic assessment for the Consented Development (**Chapter 7**) highlighted that previous research suggested freshwater angling accounted for around 5% of all visitors to the Outer Hebrides while they accounted for 12% of total visitor expenditure. This underlined the relative high per capita spend among angling tourists, which was more than double the value of non-angling tourists to the Outer Hebrides. In 1999 the expenditure per angling tourist was £522 which would now be £632.48, adjusted to today's prices. It was estimated that 7,500 anglers visited the Outer Hebrides, of which 11% were based in East Lewis. On the assumption that half of these visited areas of fishing within the local area, this would amount to over 400 visiting anglers per annum, which would be worth over £267k in direct spending within the local economy.

14.5.91 With regards to crofting, in order for the land to be used for this wind farm development, the land would need to be subject to resumption or a scheme for development under the Crofters (Scotland) Act 1993 (as amended by the Crofting Reform etc Act 2007). In either case consent of the Land Court is required. Whilst the Proposed Development would require the land to be subject to resumption or a scheme for development, it is envisaged that the current land management practices would continue almost unaffected by the Proposed Development during its 25 year operational period. However, during the construction period there would be periods of constrained access within the Development Site due to health and safety related restrictions. The extent of restricted access would be detailed in a Construction Method Statement (and, as appropriate, in accordance with any relevant scheme for development).

14.5.92 The impact of the construction period, as well as any potential impacts associated with the operation and decommissioning of the Proposed Development is considered further in **Sections 14.10-14.14** below.

Future baseline

14.5.93 From the information acquired for this assessment, there is no indication that the baseline is in the process of any significant transitions and would be expected to remain largely as described above, without the Proposed Development taking place.

Design Evolution

14.5.94 As detailed within **Chapter 3 (Scheme Need, Alternatives, and Iterative Design Process)**, the design of the Proposed Development has fully taken account of all known technical and environmental constraints within the Development Site and has sought to minimise predicted landscape and visual effects (see **Chapter 6**).

14.5.95 Given that adverse visual effects have the potential to result in adverse effects on the attractiveness or tourism potential of some receptors, and that the scale of the Proposed Development largely determines predicted economic and employment effects, the design process has indirectly taken account of potential socio-economic, tourism and recreation effects.

14.6 Consultation

14.6.1 **Table 14.3** below provides a summary of the socio-economic linked issues about the Proposed Development that have been raised by consultees and how this has been considered in this assessment.

Table 14.3 Summary of Issues Raised During Consultation Regarding Socio Economics

Consultee(s)	Issues Raised	Response and where Considered in this Chapter
CnES	Local Recreational Routes	Route 780 of the National Cycling Network goes along the Pentland Road, approximately 3km to the south of the Development Site; the EIA assessment should consider any potential impacts from the development on this route. **Section 14.11** assesses effects from the Proposed Development on tourism and recreation.
CnES	Socio-economics, Tourism and Recreation	Some of the data referred to in the scoping report is at least three years old; the Comhairle recommends that for this scoping topic the study uses the most recent available data and visitor surveys to produce a robust assessment for the EIA. **Section 14.5** provides up to date baseline information. The EIA should include a socio-economic impact assessment which includes an 'assessment of the net economic impacts' of the Proposed Development, in line with the Economic Impacts and Benefits policy of the Wind Energy SG. **Section 14.10** assesses the net economic impacts.
CnES	The Economy	We recommend that the most recent statistical information and evidence is used for the review to be conducted. **Section 14.5** provides up to date baseline information.
CnES	Population and Human Health	We would recommend an assessment is undertaken as part of the EIA and consideration is given to ways in which the Proposed Development can improve and protect health and well-being. We advise that for the purposes of this EIA assessment the developer should consult with Dr Margaret Watts, the Director of Public Health in the Outer Hebrides, NHS Western Isles. Wood have consulted with Dr Margaret Watts over the scope of any health issues which should be considered in this EIA assessment. **Section 14.12** assesses the health effects from the Proposed Development.

14.7 Scope of the Assessment

Spatial Scope

14.7.1 The spatial scope of the socio-economic assessment covers the Development Site, together with the surrounding area as described under 'Study Area' as described in **Section 14.4**.

Temporal Scope

14.7.2 The temporal scope of the assessment of socio-economics is consistent with the period over which the Proposed Development would be carried out and therefore covers the construction and operational periods which would be approximately 30 months and 25 years respectively. Decommissioning is also considered, although this would only take place at the end of the 25 year operating period, unless an extension to the operating period was subsequently granted.

Potential Receptors

14.7.3 The scope of assessment set out in the Scoping Report focused on a desk based assessment to determine direct and indirect effects on economy and employment, indirect effects on tourism and recreational interests; and any cumulative effects on the economy, employment, tourism and recreation when taking into account other wind farm development. Consideration has also been given to the health effects of the Proposed Development.

14.7.4 The following areas have been scoped out of the socio-economic, tourism and recreational assessment in this chapter, either during the scoping stage or through the EIA process:

- Effects on the amenity of local residents and the local community due to visual impact (**Chapter 6**), noise (**Chapter 12**), traffic (**Chapter 13**), and shadow flicker (**Chapter 15**) as these are considered in the relevant EIA Report chapter as noted;
- Demographic effects due to the relatively short construction period (approximately 30 months). As any local demographic changes would be temporary, and potentially very limited assuming some construction work is undertaken by local employees, it is predicted that there would be no discernible effects at regional and national levels;
- Health effects during the operation of the Proposed Development as this would only involve occasional maintenance visits from workers, with no groundworks anticipated (that could generate dust for example). The reduction in greenhouse gas emissions as a result of energy being generated by a renewable resource, which is generally considered to result in beneficial effects on health, is considered in **Appendix 9H** PMP;
- The only tourism and recreational receptors considered and assessed in the chapter are those for which **Chapter 6** has identified significant adverse effects; and
- Effects on tourism during the construction period (approximately 30 months) – significant effects are unlikely given the temporary nature of this activity and the fact that much of the construction work (excluding the short term turbine erection which is considered as part of the operational effect) would only be visible from within the Development Site boundary or relatively close to it.

14.7.5 **Sections 14.10 - 14.14** describe the potential effects on the economy, employment and industry, health, land use, public access and recreation, tourism and leisure that could arise as a result of the construction, operation and decommissioning of the Proposed Development. Cumulative effects that could occur are discussed in **Section 14.15**.

14.7.6 Mitigation and enhancement measures are described in **Section 14.16** with conclusions of significance evaluation of the Proposed Development set out in **Section 14.17** below.

Likely Significant Effects

14.7.7 It should be noted that the inclusion of effects in **Sections 14.10-14.12** does not imply that residual effects would be significant, only that potential effects have been considered. Furthermore, it is only where a given socio-economic receptor is considered to be of medium, high or very high importance that detailed assessment is required as, depending on the magnitude of a given effect, it is only for these categories that a significant effect under the EIA Regulations can occur.

14.7.8 The socio-economic receptors that have been taken forward for assessment are summarised as follows:

- Population;
- Employment and economy;
- Tourism and Recreation;
- Health; and
- Land Use.

14.7.9 The predicted effects on these receptors are considered in further detail in **Sections 14.10 - 14.12** below.

14.8 Environmental Measures Embedded into the Proposed Development

14.8.1 A range of environmental measures have been embedded into the Proposed Development and are detailed in **Chapter 3** and each of the technical chapters of this EIA Report. No further embedded measures that would influence the socio-economic assessment detailed in this EIA Report are proposed.

14.9 Assessment Methodology

14.9.1 The generic project-wide approach to the assessment methodology is set out in **Chapter 2: Approach to preparing the EIA Report**, and specifically for this socio-economic assessment in **Section 14.4**. However, whilst this has informed the approach that has been used in this socio-economic assessment, it is necessary to set out how this methodology has been applied, and adapted as appropriate, to address the specific needs of this socio-economic assessment.

14.9.2 This socio-economic assessment closely follows the approach set out in the Scoping Report submitted in July 2018 (**Appendix 2A**) and conforms with the subsequent Scoping Opinion issued by Scottish Ministers (September 2018) (**Appendix 2B**). In doing so, it takes into consideration associated consultation responses from statutory and other consultees.

14.9.3 The Proposed Development has the potential to generate a range of socio-economic effects (including tourism, recreational and economic). The method adopted for this assessment draws on publicly available information and is based upon the approach set out in Morris and Therivel[34] (2009). This is:

- Establishing the baseline to determine the existing socio-economic characteristics of the Development Site and its surrounding area (receptors);
- Defining receptor sensitivity to wind farm development where possible;
- Identifying the potential change that the receptor would experience as a result of a proposed development, with consideration given to its magnitude, temporal scope (e.g. short/long term, temporary/permanent) and valency (i.e. adverse/beneficial);
- Identifying the significance of potential socio-economic effects;
- Identifying mitigation measures where significant adverse effects are predicted; and
- Identifying any residual effects after mitigation.

14.9.4 As mentioned above, there is no specific guidance on identifying effects for socio-economics in the context of an EIA; however, there are a number of documents that can guide assessments for industry and economy and recreation and tourism effects. Predicted economic and employment effects can be quantified using the guidance set out in a report by O'Herlihy and Co Ltd (2006)[35] to Scottish Enterprise and a separate report by Renewable UK (2015)[36]. This includes consideration of effects during construction, operation and decommissioning. This guidance has been used together with updated datasets, though recognising that the geographic distribution of economic effects is project specific.

14.9.5 The guidance used to assess effects on recreational activities (including public outdoor access) accords with guidance contained within Appendix 5 of 'A handbook on environmental impact assessment'[37] (SNH, 2014). In particular, the assessment of potential impacts on physical access considers any changes to existing access arrangements during the construction, operation and decommissioning phases of the Proposed Development.

14.9.6 The tourism assessment component of this chapter follows the standards set out in the recommendations of the Moffat Report[38] (2008) and the assessment of predicted effects on leisure and tourism receptors takes account of the findings detailed in **Chapter 6, Chapter 7,** and **Chapter 13.**

Significance Evaluation Methodology

14.9.7 Where possible, guidance has been used to establish the potential effects of the Proposed Development. Where there is no prescribed guidance, professional judgement based on previous experience of wind farm development has been used. **Table 14.4** below sets out the matrix for identifying significant effects. Major effects are significant in EIA terms, moderate effects are probably significant in EIA terms and minor / negligible effects are not significant in EIA terms.

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34 http://site.iugaza.edu.ps/sghabayen/files/2013/02/John_Glasson_Riki_Therivel_Andrew_Chadwick_IntBookos.org_.pdf
35 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/48359/5229-onshore-wind-direct--wider-economic-impacts.pdf (accessed 15/01/19).
36 https://cdn.ymaws.com/www.renewableuk.com/resource/resmgr/publications/reports/onshore_economic_benefits_re.pdf (accessed 15/01/19).
37 www.snh.gov.uk/docs/A1198363.pdf (accessed 15/01/19).
38 http://www.scotland.gov.uk/Publications/2008/03/07113554/0 (accessed 15/01/19).

Table 14.4 Significance Evaluation Matrix

Sensitivity/Importance/Value	Magnitude of Change: Very High	High	Medium	Low
Very High	Major (**significant**)	Major (**significant**)	Moderate (Probably significant)	Minor (Not significant)
High	Major (**significant**)	Major (**significant**)	Moderate (Probably significant)	Minor (Not significant)
Medium	Major (**significant**)	Major (**significant**)	Moderate (Probably significant)	Minor (Not significant)
Low	Moderate (Probably significant)	Moderate (Probably significant)	Minor (Not significant)	Negligible (Not significant)

Employment Impacts

14.9.8 The employment impacts within the Study Area are defined in terms of FTE jobs[39] associated with predicted capital expenditure. The assessment has therefore focussed on the following impact categories:

- Direct economic impacts: jobs and capital spend that are wholly or largely related to construction, decommissioning, and operation and maintenance of a development;
- Indirect economic impacts (positive and negative): jobs and capital spend generated in the economy of the Study Area in the chain of suppliers of goods and services to the direct activities;
- Induced economic impacts: jobs and capital spend created by direct and indirect employees' spending in the Study Area or in the wider economy; and
- Wider economic (catalytic) impacts (positive and negative): employment and income generated in the economy related to the construction and operation of the Proposed Development. This includes the effects on inward investment, elsewhere within the construction sector (e.g. as a result of worker supply) and on other sectors of the economy.

14.9.9 For employment effects, the availability of labour and skills is critical in accommodating the demands, needs and requirements of the Proposed Development. Adequate labour and skills capacity results in a low sensitivity, while limited labour and skills capacity results in a high sensitivity. Sensitivity criteria in terms of employment are shown in **Table 14.5** below.

[39] Full Time Equivalent (FTE) jobs are not officially defined in the UK but are usually considered to be jobs which involve a minimum of 35 hours work per week.

Table 14.5 Employment, Economy, and Land Use Sensitivity

Sensitivity	Definition
Very High	Employment – Where there is the requirement for very technical specialist input, which is difficult to source ,at a national level and/or there is very low labour or skills at a local level Economy – Where the economy is very sensitive to financial change. Land Use – Where the Development Site has many (more than 10) different land use types (i.e. agriculture, fishing, recreation, residential, employment).
High	Employment -– Where there is some requirement for technical specialist input, which is difficult to source at a national level and /, or where there is limited labour or skills available at the local level. Wards of Steornahagh a Tuath, Sgir' Uige Agus Ceann a Tuath nan Loch and Loch a Tuath. Economy – Where the economy is sensitive to financial change. Land Use – Where the Development Site has multiple (7-10) different land use types.
Medium	Employment – Where there is limited requirement for very technical specialist input, which is difficult to source at a national level, and or where there is some constraints to the availability of labour or skills at the local level. Economy – Where the economy is resilient to change. Land Use – Where the Development Site has several (5-7) different land use types.
Low	Employment -– Where there no requirement for technical specialist input, and / or where there is a readily available labour force and skills. Economy – Where the economy is very resilient to financial change Land Use – Where the Development Site has few (less than 5) different land uses.

14.9.10 The magnitude of potential changes on socio-economic receptors will be assessed as defined in **Table 14.6** and **14.8** below. In the case of employment effects, this is based on participants within the labour force; and the level of occupational skills available in the Study Area as set out in **Table 14.5** above.

Table 14.6 Employment, Economy and Land Use Magnitude of Change

Magnitude of Change	Definition
Very High	Changes as a result of the Proposed Development are of national scale.
High	Changes as a result of the Proposed Development that are of greater than local scale or which exceeds recognised standards.
Medium	Noticeable changes as a result of the Proposed Development.
Low	Slight changes as a result of the Proposed Development that may not be perceptible or are within the normal seasonal/annual variation range.

Health

14.9.11 During the construction of the Proposed Development there would be a sizeable influx of construction workers onto Lewis. This could put pressure on health services and facilities on the island. There could also be other health impacts from the Proposed Development during operation, from other issues including noise, shadow flicker, blade breakage and accidents. The main factors considered relevant when defining the sensitivity of receptors relating to health are outlined in **Table 14.7** below.

Table 14.7 Health Sensitivity

Sensitivity	Definition
Very High	Where health facilities are at capacity.
High	Where there is a low / limited availability of health facilities.
Medium	Where there is a constrained availability of health facilities.
Low	Where there are readily available health facilities.

14.9.12 The magnitude of change is gauged by estimating the level of change on the receptor as a result of Proposed Development. The magnitude of change is evaluated in line with the criteria below in **Table 14.8**.

Table 14.8 Health Magnitude of Change

Magnitude of Change	Definition
Very High	Changes as a result of the Proposed Development are of national scale.
High	Changes as a result of the Proposed Development that are of greater than local scale or which exceeds recognised standards.
Medium	Noticeable changes at a local scale as a result of the Proposed Development.
Low	Slight changes as a result of the Proposed Development that may not be perceptible or are within the normal seasonal/annual variation range

Tourism and Recreation

14.9.13 Tourism and recreational behaviour would only be detrimentally affected where the Proposed Development either changes the visitor/user pattern in terms of numbers, and /or their patterns of expenditure for the worse. As such, opportunities for tourist and visitor expenditure, any potential variation in expenditure or visitor numbers, and consequent effects on turnover or employment are of key importance.

14.9.14 Recreational behaviour would be affected where a development potentially leads to a change in recreational habits or activities. Factors which might lead to change in recreational behaviour include loss, closure, or diversion of access routes; obstructing access routes; enhancing access; reduction in amenity or intrusion; enhancement in amenity; and changes in setting and context of the recreational resource[40].

14.9.15 The potential effect on recreational users is likely to be a factor of the proximity of the Development Site, the resource in terms of usage and the type of resource, the visibility of the Proposed Development, and any diversion due to its presence.

14.9.16 The main factors considered relevant when defining the sensitivity of receptors relating to recreation and tourism are outlined in **Table 14.9** below.

[40] SNH Handbook Appendix 5 Table 2 http://www.snh.org.uk/pdfs/publications/heritagemanagement/EIA.pdf

Table 14.9 Sensitivity of Recreational and Tourism Receptor

Sensitivity	Definitions
Very High	Where the receptor or resource is defined as being of National Status or has high visitor numbers (in excess of 50,000 visitors or more per annum).
High	Where the receptor or resource is defined as being National status or has high visitor numbers (in excess of 25,000 visitors or more per annum).
Medium	Where the receptor or resource is defined as being of regional status or has medium visitors numbers (10,000-24,999 visitors per annum).
Low	Where the receptor or resource is defined as being of local status or low visitor numbers (less than 10,000 visitors per annum).

14.9.17 The magnitude of change is gauged by estimating the level of change on the receptor as a result of Proposed Development. The magnitude of change is evaluated in line with the criteria below in **Table 14.10**.

Table 14.10 Recreation and Tourism Magnitude of Change

Magnitude of Change	Definition
Very High	Where the extent of changes on receptors (activities, resources, or businesses) is very large scale and a very large number of people or activities would be affected.
High	Where the extent of changes on receptors (activities, resources, or businesses) is large scale and a large number of people or activities would be affected; or where other technical chapters conclude that there may be significant effects that this assessment considers may affect visitors to the recreation/tourist receptor (for example close views of turbines).
Medium	Where the extent of changes on receptors is small in scale, but a large number of people or activities would be affected; or alternatively where the extent of changes on activities, resources and/or businesses is large in scale but only a small number of people or activities would be affected.
Low	Where the extent of changes on receptors is small in scale and would only affect a small number of people or activities; or where the Development Site would be unlikely to be visible (as it would be obscured by topography or woodland, etc) or would be at a considerable distance from receptors.

14.9.18 In line with standard EIA practice, and taking into account professional judgement, the sensitivity of receptors, as defined in **Table 14.5**, **Table 14.7** and **Table 14.9**, are generally considered against the magnitude of change (**Table 14.6**, **Table 14.8** and **Table 14.10**) to determine the significance of resultant effects as set out in **Table 14.4** above. In the case of the injection of money into the economy resulting from the capital investment however, the assessment of significance is effectively based on the magnitude of change in monetary terms, with a large magnitude of change being considered to result in a significant effect.

14.9.19 Based on the approach summarised in **Table 14.4** above, effects that would result in a change identified as major or moderate are considered to be significant in terms of the EIA Regulations and this assessment.

14.10 Assessment of Effects: Economic and Employment and Land Use – Construction, Operation and Decommissioning Effects

14.10.1 The predicted construction, operation, and decommissioning effects of the Proposed Development on the socio-economic receptors identified in this assessment are considered in further detail in the sections below.

Baseline Conditions

14.10.2 As highlighted in Section **14.5** above Lewis has a relatively diverse economic base, not dissimilar to that of Scotland as a whole, with strong health & social care, retail, construction, education and manufacturing sectors. Fishing is also an important industry for the Outer Hebrides. The renewable energy sector is also important to the regional and national economy.

Predicted Effects and their Significance

14.10.3 As noted in **Section 14.3**, where effects cannot be quantified, the assessment of significance is undertaken using professional judgement and experience. This is considered to be the case for economic effects resulting from the capital investment made in constructing, operating and decommissioning a wind farm where the assessment of significance is effectively based on the magnitude of change in monetary terms. The construction works associated with the Proposed Development has the potential to generate a range of economic benefits for local businesses as it is anticipated that a reasonable proportion of the cost of the civil, electrical and grid connection work would be spent in Scotland, and locally on Lewis.

Economic Effects – Construction and Decommissioning

14.10.4 Indicative construction and decommissioning requirements are detailed in **Table 14.11** below.

Table 14.11 Indicative Construction and Decommissioning Requirements

Required Services	Details
Accommodation	The majority of the workforce would likely be accommodated in purpose built temporary accommodation. Although some workers would require the use of local accommodation within approximately 20km of the Development Site.
Local amenities	All workers during the construction period of the Proposed Development would require food, drink and other provisions, bringing trade to the local area.
Development Site security	Throughout the construction of the Proposed Development and its decommissioning, security workers from the local area would be required to protect assets and ensure compliance with CDM Regulations.
Abnormal Load (turbines) and Crane Haulage	Specialist haulage contractors would be required to deliver turbine components and cranes to the Development Site during the construction period for the Proposed Development.
Road construction	New access tracks would be required for the Proposed Development. A local supplier may be required for road surfacing.
Balance of Plant construction	Infrastructure including temporary construction compounds and borrow pits would be required for construction of the Proposed Development. This work would be undertaken by civil engineering contractors.

Required Services	Details
Substation detailed design and construction	Specialist contractors would be required to design and construct an extension building for the on-site control building and substation, which would house all electrical and communications equipment for the Proposed Development.
Turbine foundation detailed design and construction	The final design of the foundations depends on the ground conditions and exact turbine specifications.
Turbine manufacture	The turbine manufacturer and manufacturing location is still to be confirmed. This may be outside the UK. However there is a potential UK manufacturing option: the Wind Towers Scotland facility in Machrihanish near Campbeltown.
Turbine erection	Once transported to the Development Site, all turbines would be erected into position by specialist contractors likely to be available within Scotland.
Landscaping	Post construction landscaping works may be undertaken by a local contractor.
Electrical switchgear design & installation	The Proposed Development requires the design and on-site installation of complex electrical systems and cabling.
Power transmission design	All electricity transmission cabling would need to be designed by a specialist company.
Fencers	Temporary construction fencing, and any permanent fencing required, may be installed by local contractors.
Fuel supplies and delivery	Machinery used during construction would require fuel supplies provided by a local distributor.
Construction materials supply and delivery	Materials for the construction phase would be sourced from local suppliers where possible including bricks, mortar, cement, concrete, stone, wood, steel, cabling, electricity poles etc.
Sub-contractors	Electrical fitters, carpenters, painters & decorators, plumbers may be required during the construction phase for various tasks.

14.10.5 The Review of the Generation Costs and Deployment Potential of Renewable Energy Technologies in the UK report[41] (DECC, 2011) estimates the total capital cost of a wind farm greater than 5MW constructed in 2015 to be between £1.17m and £1.80m per MW installed[42]. On the basis of 35 turbines with a power output of 196MW, using DECC's figures from 2011, the capital cost of the Proposed Development is estimated to be up to between £229m and £353m[43].

14.10.6 The RUK report 2015 found that the weighted average construction cost per MW was £1.32m, with the majority of case study projects spending within 15% of this figure. On this basis, with 196MW installed capacity, the construction phase of the Proposed Development (including turbine manufacture) could result in expenditure of up to £259m.

14.10.7 The Generation Costs and Deployment Potential of Renewable Energy Technologies in the UK (2011) report[44], the RUK report (2015) and the O'Herlihy report (2006) all recognise the importance of the capital spend during construction. The economic impact assessment set out within the O'Herlihy report (2006) splits construction spend by turbine manufacturing and construction and installations costs. The O'Herlihy report (2006) identifies that approximately 65% of the total capital spend for a proposed wind farm relates to the cost of manufacturing wind turbines, with the

[41] Available at: https://www.gov.uk/government/publications/review-of-the-generation-costs-and-deployment-potential-of-renewable-electricity-technologies-in-the-uk-study-report-by-arup (accessed 25/01/19).
[42] Figures rounded to 2 decimal places.
[43] All calculated figures in this section are rounded to 1 decimal place.
[44] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/147863/3237-cons-ro-banding-arup-report.pdf (Accessed 25/01/19).

remaining 35% related to onsite construction (balance of plant) and installation work. The RUK Report (2015) supports this analysis as it calculates that turbine manufacturing accounts for 64.4% of total capital expenditure, balance of plant contracts account for 28.6% and grid connections account for 7.1%.

14.10.8 Using the expenditure distribution profile from the O'Herlihy report (2006) and figures from The Generation Costs and Deployment Potential of Renewable Energy Technologies in the UK (2011) report, the manufacturing of the turbines for the Proposed Development could generate capital expenditure of up to£229.4m. Using the latest available figures from the BiGGAR Report (2015), the manufacturing of the turbines could result in capital expenditure of up to approximately £227.3m, the balance of plant construction phase could result in capital expenditure of up to approximately £100.9m and grid connection work could result in capital expenditure of up to approximately £25.1m[45].

14.10.9 The RUK (2015) report states that 12% of the total capital costs of an onshore wind farm (i.e. including turbine manufacturing, balance of plant and grid connection) are typically spent locally (Lewis), 36% spent in the Region/Nation (Scotland) and 47% spent within the UK. For the Proposed Development this results in a range of between £27.5m (12% of £229m) and £42.36m (12% of £353m) being spent locally and a range of between £82.44m (36% of £229m) and £127.08m (36% of £353m) spent within Scotland. Considering this and taking account of the presence of required facilities, amenities, construction materials and labour skills, it is reasonable to predict that a large proportion of 'local' spend would be on Lewis.

14.10.10 Based on these assumptions, the on-site contribution from the Proposed Development to the Council economy would result in a Low magnitude of change at the Council level (CnES), and a Medium to Large magnitude of change at the ward level (i.e. the Steornahagh a Tuath, Sgir' Uige Agus Ceann a Tuath nan Loch and Loch a Tuath Wards). At ward level, this would be a beneficial temporary Medium change on the local economy which would be a moderate positive effect that would be **probably significant**. At a national level, taking account of both on-site work and potential offsite turbine manufacturing within the UK, this level of investment would result in a Low magnitude of change, which would result in a Minor positive effect that is considered to be not significant.

14.10.11 It is therefore considered that the economic effects during the construction of the Proposed Development would result in temporary, Moderate positive effects that have the potential to be **probably significant** at the local (ward) level, but not significant when considered at the Council and national level.

14.10.12 The Development Site is considered to be of Very High sensitivity to change and based on these assumptions there would be a high level of change with Major positive economic effects associated with construction which is therefore considered to be **significant**.

14.10.13 The wards of Steornahagh a Tuath, Sgir 'Uige Agus Ceann a Tuath nan Loch and Loch a Tuath are also considered to be of High sensitivity to change, there would be a high level of change with Major positive economic effects associated with construction which is therefore considered to be **significant**.

14.10.14 The Council is considered to be of Medium sensitivity to change, there would be a Medium level of change with moderate positive economic effects associated with construction which is therefore considered to be **probably significant**.

[45] All figures rounded to 1 decimal place.

14.10.15 At the Scottish level Scotland as a whole is considered of low sensitivity to change and there would be a Low level change with Minor positive effects that are therefore considered to be not significant.

14.10.16 The potential job creation outlined above may help to attract workers back to Lewis from mainland Scotland or elsewhere who had moved away for employment. This could stimulate further economic benefits through demand for housing or other infrastructure. It is however not possible to predict the scale of any such benefits as this would depend upon how many workers returned.

Long Term Operation and Maintenance

14.10.17 Following construction of the Proposed Development, it would enter into a 25 year operational period. During this phase of the project's life cycle, the Operations and Maintenance (O&M) contracts would deliver the planned routine and scheduled maintenance of the wind turbines, the statutory inspections and servicing and also high voltage management and maintenance.

14.10.18 The O&M work stream would result in direct spend in the local area per annum and creation of some direct full time skilled jobs for the local area. There would also be additional ancillary local spend and job creation through the use of the local supply chain. This may include, but not be limited to, elements such as accommodation, fuel, vehicle and plant hire, routine maintenance and winter maintenance of the wind farm tracks for the Proposed Development and habitat management. The operation of the Proposed Development would result in permanent on site staff, and other temporary staff visiting the site for maintenance and repair work. This would result in a Low magnitude of change to the economy which would have a Minor positive effect that would be not significant at the Ward, Council and national level.

Wind Farm Decommissioning

14.10.19 There would be further local spend at the stage that the Proposed Development is decommissioned. The precise nature of the decommissioning works is difficult to predict as ultimately the detail would be prescribed by a scheme that would need to be submitted to CnES in accordance with the planning condition; typically around one year before cessation of the turbines operation.

14.10.20 However, in terms of the contracting strategy, the decommissioning works on a wind farm can be treated differently to the construction works, as they would be phased over a period of time which lends itself to the engagement of a different supply chain that would not necessarily require such specialist skills and experience since tracks and ground infrastructure (below 1m) would remain in situ.

14.10.21 Once the wind turbines are dismantled by specialists, the subsequent decommissioning and dismantling of wind farm infrastructure for removal is likely to be undertaken by smaller contractors.

14.10.22 The cost of decommissioning a wind farm in over 25 years' time is difficult to estimate at this point in time, however wind farm decommissioning bonds are available which are designed to provide a financial security to local authorities and/or land owners for the decommissioning and reclamation of a wind farm development, should the wind farm operator go out of business. These are based upon estimated costs for site restoration (leaving tracks in situ) and have had a value in the order of £15,000 per MW for other wind farms. This which would amount to a minimum of £2.94m for the 196MW Proposed Development.

14.10.23 The Development Site and the wards of Steornahagh a Tuath, Sgir 'Uige Agus Ceann a Tuath nan Loch and Loch a Tuath are considered to be of high sensitivity to change. The Council is considered to be of Medium sensitivity to change, and Scotland as a whole is considered of Low sensitivity to change. This level of investment in decommissioning the Proposed Development is considered to result in a Low magnitude of change at the local level (Development Site and ward level) in terms of accommodation, local spend and use of local businesses resulting in a Minor positive effect, and a Low magnitude of change at the Council and national level, and a Minor positive effect which is not significant.

14.10.24 Overall, the effects generated by the decommissioning of the Proposed Development are considered to be temporary, Minor positive and not significant at the local and national level.

Accommodation

14.10.25 Employment associated with the construction of the Proposed Development would be likely to increase occupancy in nearby hotels and other short-term accommodation, as well as increasing trade in local hospitality establishments. It is considered that the area has a constrained level of accommodation (Medium sensitivity) as it is an island with a limited amount of temporary accommodation available. It is not likely to result in an overwhelming volume of local accommodation/hospitality bookings at a particular point in time as purpose built accommodation is likely to be required for the construction workforce. Therefore these potential changes are considered to represent a Medium positive magnitude of change on local accommodation receptors, resulting in a temporary, beneficial Moderate effect which is considered **probably significant**. The effects generated by the decommissioning of the Proposed Development are considered to be Minor, temporary, beneficial and not significant.

Employment Effects

14.10.26 The RUK (2015) report in Table 6: GVA and Employment Ratios (Construction Phase) estimates that average total turnover per employee during the construction phase of a wind farm is £137,942. If replicated during the construction of the Proposed Development this could result in local employment across CnES ranging from up to 199 FTE (£27.5m ÷ £137,942) to 307 FTE (£42.36m[46] ÷ £137,942), and Scottish level employment ranging between up to 597.6 FTE (£82.44m ÷ £137,942) and 921.3 FTE (£127.08m ÷ £137,942) throughout the construction period.[47]

14.10.27 In addition to the predicted employment levels calculated above, it is expected that further employment would be sustained or created through induced and indirect economic effects. This would be likely to occur through the supply chain and the impact of wages and salaries on the local economy including increased hotel occupancy rates. This would enable the retention of employment related economic benefits in the local economy. However, the extent of these indirect and induced employment effects cannot accurately be determined until individual contractors are appointed, which would only take place after any consent for the Proposed Development is granted by Scottish Ministers. Furthermore, indirect and induced employment benefits would also be dependent on the extent to which employees of the successful contractors decide to spend their income on local goods and services.

14.10.28 It should be noted that the number of construction workers employed would depend on the duration of the construction programme and may vary if the programme is altered. It is further acknowledged that the number of construction related FTEs would vary depending on project specific requirements and that construction phase employment would only be sustained for a temporary period of time.

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[46] The £27.5 and £42,36m figures relate to the estimated percentage of capital cost spent locally.

[47] It is acknowledged that these calculations do not provide a breakdown of predicted turbine manufacture, balance of plant and grid connection employment split across local, regional (Scotland) and UK geographies, however providing such statistics would involve more complicated analysis which would be of limited value, especially given that the location of all contractors would not be confirmed until after any consent is granted for the Proposed Development by Scottish Ministers.

14.10.29 On the basis of the assessment outlined above and the methodology identified in **Section 14.9**, a qualitative assessment has been carried out. Employment at the local level is considered to have medium sensitivity across CnES and locally of the Development Site (i.e. within the Steornahagh a Tuath, Sgir 'Uige Agus Ceann a Tuath nan Loch and Loch a Tuath Wards) owing to the level of construction workforce across CnES (see **Table 14.3**). The predicted increase in employment during the construction phase of the Proposed Development would be of temporary/short term benefit and is considered to represent a Medium magnitude of change at the local level (i.e. at Council level and local ward level) owing to the number of jobs created. This would result in a temporary and beneficial Moderate effect across CnES, and a temporary beneficial moderate effect within the locality of the Development Site (i.e. the ward level) which is considered to be **significant**. At the national level, the predicted increase in employment during construction is a temporary/short term beneficial effect of Low magnitude of change, owing to the limited number of jobs created when compared with the national levels of jobs in the renewable energy sector (11,625 FTE jobs – Scottish Renewables, 2014). This would result in a temporary, beneficial Minor effect that is not significant.

14.10.30 It is therefore considered that the construction related employment effects of the Proposed Development would result in temporary, beneficial Moderate effects that are considered **probably significant** in EIA terms for the local level effects. The effects generated by the decommissioning of the Proposed Development are considered to be Minor, temporary, beneficial, and not significant.

Land Use

14.10.31 The Development Site is currently partly used for angling and some walking associated with the angling, otherwise it is vacant and therefore considered to have a Low sensitivity. The construction process would require the temporary closure of some of the land used for angling in construction areas. Once operational, the Proposed Development would not affect angling activities.

14.10.32 In addition to angling there are some areas of the Development Site currently used for the grazing of livestock, including sheep and Highland cattle, which would be affected by the construction of the Proposed Development. Access would be restricted during the construction period and again during the decommissioning phase, and this could constrain the access to some areas of common grazing during this period, although it is likely that as the construction works progressed smaller areas of the site would be closed at different times for relatively short periods of the overall 30month construction duration. The precise extent of this restricted access would be detailed in a Construction Method Statement which would be prepared after consent was granted. If the relevant parts of the common grazing areas were being used for grazing, the access restriction could result in livestock requiring to be moved to other areas for grazing during the construction period and / or more fencing to be erected to ensure that livestock could not access any construction areas. However, given that there are alternative areas where grazing could occur and the low intensity of grazing within the Development Site, the overall magnitude of change would be Low. During operation, crofting would be able to continue within the Development Site, subject to limited restrictions, resulting in a Negligible effect that is not significant.

14.10.33 Owing to its current land use, the Development Site is considered to be of Low sensitivity to land use change. Therefore with a Low magnitude of change predicted there would be a temporary, Negligible land use change effect during construction, operation and decommissioning, which is considered not significant.

Compensatory Payments to Crofters

14.10.34 On the basis of the crofting law as set out in the Crofters (Scotland) Act 1993 (*as amended by the Crofting Reform etc Act 2007)*, compensatory payments would accrue to crofting townships where land has been affected by the siting of wind turbines or access tracks on common grazing land. Most of the land affected by the Proposed Development is common grazing land. In order for the Proposed Development to be sited on common grazing land, the land would need to be either (i) resumed from crofting tenure, or (ii) managed under a scheme for development, in each case in accordance with the terms of the Crofters (Scotland) Act 1993. Resumption and schemes for development require to be authorised by the Scottish Land Court.

14.10.35 The Land Court would ultimately determine the appropriate level of compensation due for resumption or under a scheme for development. It is assumed, given the high level of lease rental payments agreed with the Stornoway Trust, that for the purposes of this analysis this would result in the relevant crofting communities receiving compensation from the developer equivalent to 50% of the lease rental payments agreed with the Stornoway Trust. Whilst the exact amount of payment to crofters is still to be determined, the compensatory payments would provide a benefit to crofters and so this is considered to be a long term moderate positive effect at a local level which is **potentially significant** (subject to what the agreed payment amount is) and a Negligible positive effect at a national level which is considered to be not significant.

14.10.36 The extent to which such compensatory payments accruing to the crofting communities would generate economic benefits within the Outer Hebrides would depend on the degree to which the income is retained and spent locally and whether it flows into consumption or investment. If there was an income stream of over £9million then this would be a Minor magnitude of change at a local level (both ward and Council level), and a Negligible magnitude of change at a national level. This would represent a Moderate positive effect at a local level which is **potentially significant** and a Negligible positive effect at a national level and therefore not significant.

Economic Effects – Operation

Economics Effects

14.10.37 The RUK report (2015) estimates the level of operational investment for a wind farm of greater than 5MW to be between £23,000 and £130,000 per year per MW installed. The report explains that the large differential in this cost range is due to differences in the size of developments, land contracts and whether or not turbines were still under warranty across the case study projects examined. The weighted average cost was £59,867 per MW installed per annum.

14.10.38 On this basis the Proposed Development has the potential to generate between £4.5M and £25.4M each year during its operational life[48]. Therefore, over the 25-year period of operation, the Proposed Development is predicted to generate total operations and maintenance expenditure of between £112.5M and £635M. Using the weighted average operations and maintenance cost of £59,867 per MW installed per annum quoted within the RUK (2015) report, this would generate up to around £11.7M[49] of operations and maintenance expenditure per annum throughout the operational life of the Proposed Development, or £292.5M in total over the 25 year lifespan of the Proposed Development.

14.10.39 In terms of the geographical distribution of operations and maintenance expenditure, the BiGGAR report states that 42% of expenditure occurs locally and 58% is within the region/nation. Therefore it is predicted that the Proposed Development could result in between £1.89M and £10.7M of local annual operations and maintenance expenditure (between £47.3M and £266.7M over the 25 year lifespan of the Proposed Development) and between £2.61M and £14.7M of annual operations and maintenance expenditure (between £65.25M and £368.29M over the 25 year lifespan of the Proposed Development) within Scotland. It should however be noted that the RUK report identifies

[48] All figures in this section are rounded to 1 decimal place.
[49] £59,867 x 196MW = £11,733,932 per annum.

that operating costs vary throughout the life of a wind farm, with costs noticeably increasing from the baseline position after five years due to increased maintenance requirements.

14.10.40 The operation and maintenance of the Proposed Development would provide an annual contribution to the local economy throughout its consented operating period together with the anticipated community benefit contribution. Within the locality of the Development Site (i.e. Steornahagh a Tuath, Sgir 'Uige a Gus Ceann a Tuath nan Loch and Loch a Tuath wards) this would represent a Medium magnitude of change due to an anticipated noticeable increase in expenditure. Therefore at the local level, predicted economic effects associated with the operation of the Proposed Development are considered to be long term positive and **significant**. At regional and national scales, predicted economic effects associated with the operation of the Proposed Development are considered to have a Low magnitude of change, which is considered to have a Minor positive effect that is long term but not significant.

14.10.41 Wind farms are liable for business rates. This would generate an additional economic effect in addition to operations and maintenance expenditure. The rateable value of wind farms in Scotland is determined on a case-by-case basis based on the installed capacity and load rate; the Scottish Assessors Association has published Practice Note 2, Valuation of On-shore Turbines/Wind Farm in order to help calculate the rateable value. Based on the version approved for publication in July 2016[50], the Proposed Development falls under the site categorisation of Scottish Renewables Obligation 3 (SRO3). For SRO3, there is rate of £55 per MW to be applied. For the 196MW Proposed Development this equates to £10,780. For the total installed generating capacity this Practice Note states that the appropriate percentage to be applied is 2.5%.

14.10.42 The Scottish Assessors Association highlights that for installed capacity of 70MW and over of electricity mainly for sale for distribution for sale to consumers the cost per MW is £250,000. For the 196MW Proposed Development this equates to £49m. This is considered to be a Medium magnitude of change, that would be long term and beneficial. This would have a Moderate positive effect which is considered **probably significant** at a local level. At a national level, there would be a Low magnitude of long term beneficial change which would result in a Minor positive effect, which is considered not significant. It should be noted that these rates may be subject to relief or supplements that are not known at this stage; and the rateable multipliers are reviewed on a five-yearly basis, the last of which took place in 2015.

14.10.43 Overall the projected effects during the operation phase of the Proposed Development on the economy would result in a 25 year (long term) and beneficial effect that is considered **significant** at the local level, but not significant at the regional and national level.

Accommodation

14.10.44 A number of hotels and bed and breakfasts are located within Stornoway Town. Operations and maintenance activities would be likely to increase occupancy in nearby hotels and other short term accommodation, as well as increasing trade in local hospitality establishments, throughout the operational phase of the Proposed Development. However, it is not likely to result in an overwhelming influx of local accommodation or hospitality bookings at a particular point in time. Owing to the predicted limited frequency and scale of operations and maintenance activities, these potential changes are considered to represent a Small-Negligible positive magnitude of change on local accommodation receptors, resulting in a long term beneficial Minor effect which is considered not significant.

14.10.45 Whilst there could be visibility of the Proposed Development from tourist accommodation receptors, there is no quantifiable evidence available to indicate that this would be likely to

[50] https://www.saa.gov.uk/blog/document-search/wind-turbineswind-farms-on-shore/

generate any significant adverse effects relating to the visitor attractiveness or tourism potential of such receptors (thus also in terms of accommodation, occupancy levels, business turnover and wider socioeconomic effects). This conclusion is supported by findings from the review of academic research, surveys and polls regarding public and tourist attitudes to wind farms which is detailed in **Section 14.5** above.

Employment Effects

14.10.46 There would be potential for both national and local employment for the maintenance of the Proposed Development. It is not anticipated that the Proposed Development would result in any job losses taking account of the neutral effect on land use and the not significant effect on tourism and recreation receptors as assessed below.

14.10.47 The BiGGAR (2015) report estimates (Table 9: GVA and Employment Ratios (Operations and Maintenance) that average total turnover per employee during the operational phase of a wind farm is £121,935. If replicated during the operational phase of the Proposed Development, this could result in total employment ranging from up to 36.9 FTE (£4,500,000÷£121,935[51]) and 208.3 FTE (£25,400,000 ÷ £121,395) per annum.

14.10.48 In terms of the geographical distribution of predicted operations and maintenance employment:

- Local annual operations and maintenance expenditure (within CnES) could create up to between 15.5 FTE (£1.89m÷121,935) and 87.7 FTE (£10.7m÷£121,935) jobs per annum in CnES during the operational phase of the Proposed Development[52]. The location and duration of all jobs would depend upon specific operations and maintenance requirements; and
- National annual operations and maintenance expenditure (within Scotland) could create up to between 21.4 FTE (£2.61m ÷ £121,935) and 120.6 FTE (£14.7m ÷ £121,935) jobs per annum in Scotland during the operational phase of the Proposed Development[53]. The location and duration of all jobs would depend upon specific operations and maintenance requirements. This is particularly important for the Proposed Development, in that on island jobs may not be as high as suggested by the multiplier owing to the availability of the technical experience needed.

14.10.49 In summary, the Proposed Development is predicted to generate operations and maintenance related employment ranging between 15.5 FTE – 87.7 FTE jobs in CnES and 21.4 – 120.6 FTE within Scotland. This increase in employment is considered to be a Low magnitude of change across CnES and a Medium magnitude of change within the locality of the Development Site (i.e. within the Steornahagh a Tuath, Sgir' Uige Agus Ceann a Tuath nan Loch and Loch a Tuath wards). Operational effects on employment at the national level would be a Low magnitude of change. Overall, the operation of the Proposed Development is predicted to have a beneficial moderate positive effect on employment at the local level according to the multiplier, however in reality, it may be that the operational benefits are further reaching than at a local or Council level. Therefore, the effects are considered to be not significant at both the local level and at the national level.

Land Use Impacts

14.10.50 In terms of land use change, the long term land management use can continue unaffected by the Proposed Development with angling continuing unimpeded during operation. In addition, the

[51] See section 14.10.5.
[52] Figures rounded to 1 decimal place.
[53] Figures rounded to 1 decimal place.

Proposed Development would provide an income stream for the landowner. This Low magnitude of change would result in a long term beneficial effect, which is considered not significant.

14.10.51 Livestock grazing should not be affected by the operation of the Proposed Development as it is anticipated that long term land management practices would continue unimpeded. While there would be longer term displacement of livestock from some areas allocated for common grazing as a result of borrow pits and the site compound and electricity substation for example, only a very small proportion of the Development Site would be affected (38.13ha). Furthermore, the new access tracks would be available for use by all crofters. Overall it is considered that there would be a Low magnitude of change at worst and a Negligible effect (both from any displacement of livestock and increased access on the Development Site from the new tracks) which is considered not significant.

Table 14.12 Summary of Significance of Effects

Receptor and Summary of Predicted Effects	Sensitivity/ Importance/ Value of Receptor[1]	Magnitude of Change[2]	Significance[3]	Summary Rationale
Economic and Employment (Construction and decommissioning)	Medium	High at Local level Low at Council level Low at National level	**significant** at local level Not significant at Council and National level	There would be considerable spend at the local level from the capital cost of the construction of the Proposed Development. This level of spend is considered to be **probably significant** at the local (ward level) and not significant for the Council and National Level. The economic effects generated by the decommissioning of the Proposed Development cannot be accurately estimated at this point but a bond for the restoration of the site could amount to £2.8m. This economic effect of decommissioning is considered to be temporary, beneficial and not significant at the local and national level. Due to the potential number of FTE jobs during the construction phase of the Proposed Development, this is considered to be **significant** at a local level for Lewis.
Economic and Employment (Operation)	Medium	Medium at local level Low at Council level Low at National Level	Not significant at local level and national level	The Proposed Development is predicted to generate operations and maintenance related employment ranging between 387.5 FTE – 2187.2 FTE jobs locally (two of which would be site based) and 535.1 – 3020 FTE within Scotland. This is considered to be not significant at the local level and national level. The Proposed Development is liable for business rates which would be £49m over the lifetime. This is considered to be a medium magnitude of long term beneficial change at a Council level, which is considered to be significant, and Low at a national level which is considered to be not significant. There would be at least 2 FTE on site during the operation of the development, with further people employed for maintenance and repair. This is considered to be a low magnitude of change at both local and national level, which would result in an effect that is not significant.

Receptor and Summary of Predicted Effects	Sensitivity/ Importance/ Value of Receptor[1]	Magnitude of Change[2]	Significance[3]	Summary Rationale
Land Use **(Construction and Decommissioning)**	Low	Low at local level Very Low at National level	Not significant	Owing to its current land use (angling in some parts of the Development Site and some small areas of livestock grazing but no other formal land uses), the Development Site is considered to be of Low sensitivity to land use change. Therefore with a Low magnitude of change predicted there would be a temporary, neutral land use effect during construction and decommissioning, which is considered to be not significant.
Landuse **(Operation)**	Low	Low at local level Very low at National level	Not significant Not significant	Long term land management use should continue unaffected by the Proposed Development with angling and livestock grazing continuing unimpeded over most of the Development Site during operation. This Low magnitude of change would result in a long term negligible neutral effect which is considered to be not significant.
Crofting **(Construction, Operation and Decommissioning)**	Low	Medium at Local level Low at National level	Not significant Not significant	The compensation payment is considered to be a medium magnitude of change at a local level, and low at the national level, which is considered to be overall not significant.

1. The sensitivity/importance/value of a receptor is defined using the criteria set out in Section 14.10 above and is defined as low, medium and high.
2. The magnitude of change on a receptor resulting from activities relating to the development is defined using the criteria set out in Section 14.10 above and is defined as small, medium and large.
3. The significance of the effects is based on the combination of the sensitivity of a receptor and the magnitude of change and is expressed as major (significant), moderate (probably significant) or minor/negligible (not significant), subject to the evaluation methodology outlined in Section 14.10.

14.11 Assessment of Effects: Tourism and Recreation Construction, Operation and Decommissioning Effects

Baseline Conditions

14.11.1 As detailed in **Section 14.5**, the Outer Hebrides is a popular destination for tourism and various recreational pursuits. Tourism provides a very important source of income for the Islands. The total overall value of visitor spend on the Outer Hebrides in 2017 was £65M with the largest proportion of this (£51.1M) coming from leisure visitors. Overall, the total value of visitors to the Outer Hebrides economy has increased from £53.5M in 2013 to £65M in 2017. It is clear therefore that tourism is very important both for Lewis and the wider Outer Hebrides.

14.11.2 There are no tourist attractions within the Development Site and the only formal recreational pursuit undertaken directly within the Development Site is angling.

Predicted Effects and their Significance

Recreation Construction and Decommissioning Effects

14.11.3 Core Paths and other designated walking routes would not be directly affected by construction activities. However, during the construction phase the public 'right to roam' normally enjoyed through the provisions of the Land Reform (Scotland) Act 2003, would be restricted within the Development Site for health and safety reasons and to ensure compliance with the CDM Regulations 2015. An access management plan would be prepared prior to construction of the Proposed Development, as well as a construction method statement.

14.11.4 Taking into account the lack of any identified public access receptors within the Development Site, it is considered that the construction phase of the Proposed Development would result in a temporary Low magnitude of change to public access within a Low sensitivity site. The resulting Negligible effects on public access would therefore be not significant.

14.11.5 Aside from temporarily halting of access within the vicinity of construction areas, the construction of the Proposed Development is not expected to generate any direct effects on specific recreational pursuits within the Development Site. Given that much of the construction work (excluding turbine erection) would only be visible from within the Development Site itself, indirect (visual) effects on recreational activities would only result in a temporary Negligible magnitude of change on a Low sensitivity site, resulting in a Neutral effect which is not significant.

14.11.6 **Chapter 9 and 11** conclude that with the adoption of recommended embedded and additional mitigation measures the construction of the Proposed Development would not result in any residual significant effects on water levels, flow and quality on and off the Development Site. As a result, no adverse effects are predicted for any water related recreational activities (e.g. canoeing, fishing, kayaking, etc.) that may be undertaken on any of the local watercourses. However, there are some new bridges and a number of culverts on smaller watercourses required during the construction and subsequent operation of the Proposed Development. These bridges and culverts may have an effect on water based recreational activities during the construction of the Proposed Development, although as previously mentioned the only known recreational activity undertaken within the Proposed Development site is angling and also the associated walking. As the Development Site is considered to be of Low sensitivity for recreational uses then any potential disruption to water based activities as a result of construction works is considered to be not significant.

14.11.7 Taking into account the small number of public access receptors within the Development Site, it is considered that the construction phase of the Proposed Development would result in a temporary Low magnitude of change in respect of public access within a Low sensitivity site. The resulting Negligible effects on public access would therefore be not significant.

14.11.8 It is therefore considered that the construction of (and decommissioning of) the Proposed Development would result in temporary effects on recreational receptors that are considered to be not significant.

Tourism – Operational Effects

14.11.9 Stornoway is one of the principal gateways for Tourism Arrivals in the Outer Hebrides and the Proposed Development is located approximately 1.5km to the west of Stornoway. The Proposed Development has the potential to indirectly affect tourism and recreational activities outwith the Development Site through generating landscape and visual effects at tourism destinations, areas/routes where recreational pursuits are undertaken, and communication routes regularly frequented by tourists.

14.11.10 Owing to the expected minimal level of maintenance activity required, **Chapter 13** concludes that traffic associated with the operational phase of the Proposed Development would not result in any significant traffic or transport related effects which could potentially generate wider socio-economic tourism or recreational effects.

14.11.11 Individual tourism receptors located within 35km of the Development Site and within the ZTV of the Proposed Development are listed in **Table 14.12**. Detailed assessments of potential landscape and visual and cultural heritage effects on these receptors have been undertaken where appropriate, as detailed in **Chapter 6** and **Chapter 7**. It is important to note that any adverse effects identified within **Chapters 6** and **7** of this EIA Report relate only to those subject specific assessments, rather than necessarily to potential effects on visitor attractiveness and tourism.

14.11.12 Informed by the aforementioned subject specific assessments, an assessment of effects on visitor attractiveness and tourism potential at relevant receptors is provided below in **Table 14.13**.

14.11.13 The determining factor within the assessment provided below is the extent to which predicted effects on the physical environment may reduce the attractiveness of individual tourist destinations or visitor attractions, thereby potentially resulting in a reduction in visitor numbers.

14.11.14 The assessment of tourist routes and destinations presented in **Table 14.13** concludes that the effect on tourism receptors as a result of the Proposed Development would be not significant.

14.11.15 **Chapter 7** has identified that there would be **significant** effects on Stornoway War Memorial and Druim Dubh Stone Circle in relation to the effect on setting through visual imposition on views from these assets. However, whilst these assets are important locally, neither of these assets are considered to be important tourist attractions for the Island and so it is not considered that there would be any wider adverse effects on tourism as a result of the identified effects on these two assets.

Table 14.13 Assessment of Operational Effects on Tourism

Receptor Name	Sensitivity	Magnitude	Level of Effect	Approximate Distance from Site Boundary (km)	Assessment
Stornoway Golf Club / Lews Castle and Lady Lever Park GDL	Medium	Low	Minor NS	2.2	The Stornoway Golf Club, Lews Castle and Lady Lever Park GDL are considered to have a Medium sensitivity due to visitor numbers per annum. Key views out of Stornoway Golf Club, Lews Castle and Lady Lever Park GDL are orientated eastward away from the Proposed Development to the west. This makes views of the Proposed Development from these tourist attractions limited and local woodlands would further help to screen the Proposed Development. The magnitude of change to these tourist attractions is considered to be Low therefore the level of effect is Minor and not significant.
Lewis War Memorial	Medium	Low	Minor NS	3.03	The Lewis War Memorial is considered to have a Medium sensitivity due to visitor numbers per annum. All of the proposed turbines would be visible to some degree from the War Memorial though visitors would primarily be oriented to look towards the War Memorial, the Eye Peninsular and Stornoway town. The magnitude of change to the Lewis War Memorial is considered to be Low therefore the level of effect is Minor and not significant**.** (see **Figure 6.25**)
Standing Stones of Calanais (Callanish)	High	Low	Minor NS	13.3	The Standing Stones are considered to have a high sensitivity due to having National Status. The visibility of the proposed turbines from the Standing Stones would be limited due to the distance from the Standing Stones to the turbines and the intervening built and natural environment screening the Proposed Development. The magnitude of change to the Standing Stones is considered to be Low therefore the level of effect is Minor and not significant. (see **Figure 6.40**)
Tiupman Head (Rubha an T-siumpain)	High	Low	Minor NS	18	The Tiupman Head is considered to have a High sensitivity due to visitor numbers per annum. The visibility of the proposed turbines from the Tiupman Head would be limited due to the significant distance from the Tiupman Head to the turbines and the intervening built and natural environment screening the Proposed Development. The magnitude of change to the Tiupman Head is considered to be low therefore the level of effect is Minor and not significant.

Receptor Name	Sensitivity	Magnitude	Level of Effect	Approximate Distance from Site Boundary (km)	Assessment
Iolaire Memorial	Medium	Low	Minor NS	6.5	The Iolaire Memorial is considered to have a Medium sensitivity due to visitor number per annum. The visibility of the proposed turbines from the Iolaire Memorial would be limited due to the distance from the Iolaire Memorial to the turbines and due to views from the monument primarily being orientated south, and not west towards the Proposed Development. The magnitude of change to the Iolaire Memorial is considered to be Low therefore the level of effect is Minor and not significant. (See Figure 6.50)
An Cliseam (Clisham)	High	Low	Minor NS	30.8	The An Cliseam is considered to have a high sensitivity due to visitor number per annum and due to having National Status. The visibility of the proposed turbines from the An Cliseam would be limited due to the considerable distance from the An Cliseam to the turbines. The magnitude of change to the An Cliseam is considered to be Low therefore the level of effect is Minor and not significant.

NS – not significant

Recreation – Operational Effects

14.11.16 During the operational phase of the Proposed Development, the public would have unrestricted access to the Development Site under the general 'right to roam' enshrined in the Land Reform (Scotland) Act 2003. Temporary public access restrictions would only apply if it is necessary to undertake intensive maintenance or upgrading to on-site infrastructure including turbines and access tracks, in accordance with the CDM Regulations 2015.

14.11.17 During the operational phase, the public would have access to approximately 28.7km of new tracks and 13 watercourse crossings would be created through the Development Site for Proposed Development. This would provide a new network of publicly accessible routes across the Development Site, thereby facilitating relatively easy public access to areas to areas that would otherwise have been more challenging to access. The development of this access track network is considered to result in a Low magnitude of change and a beneficial permanent Moderate effect on public access, which is considered to be not significant.

14.11.18 There are 3 Core Paths located within 15km of the Development Site. Core Path 3 and 4 would result in no visibility of the turbines because of intervening landform, vegetation and buildings, and are scope out of this assessment as they would not result in a significant effect. Core Path 6 is a network of paths within Lews Castle and Lady Lever Park GDL, approximately 2km east of the Proposed Development. It is approximately 23km in length (see **Figure 6.27**). This path is considered to be of High sensitivity as it is national route. The turbines would be visible to users of the path in close proximity from short sections of the route. The views would be wide and panoramic, and the turbines would be seen in the context of other existing man-made elements with the primary views remaining towards the settlement of Stornoway and the sea. For the remainder of the route, (11km), there would be very limited or no visibility of the Proposed Development, therefore the route would experience a Medium magnitude of change locally, and Low to no view further afield. This is considered to result in a Major and **significant** local effect, and Minor and a not significant effect further away.

14.11.19 The Sustrans Cycle Route 780 extends from the Butt of Lewis to Tarbet and is 113km in length within the LVIA Study Area. It is considered to be High sensitivity owning to it being a national route. At its closest point (3.3km to the nearest turbine), visibility would be restricted owning to landform and vegetation. There would be visibility around the Barvas area (see **Figure 6.43**), This would result in a Low effect that would be Minor and not significant.

14.11.20 The Hebridean Way is a long-distance walking or cycling route approximately 252km in length and crosses the entire Outer Hebrides. It extends from the settlement of Stornoway to Tarbert on the Isle of Harris. Because it is a national route, t's sensitivity is High. The route passes through the centre of the Proposed Development, and at its closest point is located approximately 142m from a Proposed Wind Turbine. There would be visibility of turbines for approximately 11km of the route, which is considered to result in a Medium magnitude of change. This would have a Major effect for a small portion of the route which is considered to be **significant** (see **Figure 6.24** and **Figure 6.22**).

14.11.21 The Timeless Way is a long-distance walking route approximately 322km in length and crosses the Outer Hebrides from the Butt of Lewis to Vattersay. Because of its national status, it has a High sensitivity. There would be theoretical visibility for approximately 35km of the route that extends along Pentland Road, the A858 and B895 towards North Tolsta. This would result in a High magnitude of change, which would be Major and **significant** within 5km of the Development Site, beyond that effects would diminish with distance (see **Figure 6.22, 6.40, 6.42, 6.44** and **6E.3**).

14.11.22 An assessment of visual effects from the operation of the Proposed Development is set out in **Chapter 6**. A summary of the visual effects on these Core Paths is provided in **Table 14.14** below.

Table 14.14 Assessment of Operational Effects on Core Paths and Other Paths / Recreational Routes

Receptor Name	Sensitivity	Magnitude	Level of Effect	Approximate Distance from Site Boundary (km)	Assessment
Core Path 6: Lewis Castle Grounds Paths	High	Medium-no change	Major to no effect S to NS	2	Core Path 6 is considered to have a high sensitivity due to its national status as a Core Path. There would be major changes at close proximity to the Development Site, these would diminish with distance, resulting in **significant** effects locally to 'not significant' effects. .
Sustrans Cycle Route 780	High	Low	Minor NS	2k	The Sustrans Cycle Route 780 is considered to have a high sensitivity. The Proposed Development would be visible to some degree, though often screened by intervening topography and vegetation. The Cycle Route is 2km away from the Proposed Development at the closest point. The magnitude of change to the Cycle Route is considered to be Low therefore the level of effect is Minor and not significant.
Hebridean Way	High	Medium	Moderate S	0.142	The Hebridean Way is considered to have a High sensitivity. The Hebridean Way is 142m away from the Proposed Development at its closest point. The magnitude of change to the Hebridean Way is considered to be Medium therefore the level of effect is Major and **significant**.
Timeless Way	High	High	S	0.142	The Timeless Way is considered to have a high sensitivity. The Timeless Way is 142m away from the Proposed Development at its closest point. The magnitude of change to the Timeless Way is considered to be High therefore the level of effect is Major and **significant**.

NS – Not significant

S – Probably Significant

14.11.23 Given that the Development Site is not a recognised tourism destination and is not formally used for specific land based recreational purposes other than for angling and associated walking, it is considered that the Proposed Development would not result in direct effects upon specific recreational activities.

14.11.24 **Chapter 9** and **11** of the EIA Report concludes that with the adoption of recommended embedded and additional mitigation measures, the operation of the Proposed Development would not result in any residual significant effects on water levels, flow and quality on and off the Development Site. As a result, no adverse effects are predicted for any water related recreational activities (e.g. canoeing, fishing, kayaking, etc.) that may be undertaken on any of the local watercourses.

14.11.25 In relation to operational effects on recreational receptors, the Proposed Development would result in beneficial long term local access effects within the Development Site. The overall predicted operational level of effect on recreation is considered not significant.

14.12 Assessment of Effects: Health - Construction, Operation and Decommissioning Effects

Baseline Conditions

14.12.1 As highlighted in **Section 14.5** above, Lewis includes areas with the lowest life expectancy for males but also has areas with higher life expectancy for females, while statistics relating to early deaths from cancer and children living in poverty are better than the national averages. Almost a quarter of those of working age are on long term sick, which is lower than for Scotland as a whole but higher than that for Great Britain.

14.12.2 There are three hospitals (one in Stornoway) and a number of GP surgeries (three on Lewis that each have six GP's) dotted throughout the Outer Hebrides. There is also the Western Isles dental centre in Stornoway. There is no indication that any of these medical facilities are currently under-resourced or at capacity.

Predicted Effects and their Significance

Construction and Decommissioning Effects

14.12.3 The construction of the Proposed Development would result in an influx of construction workers onto Lewis. Population movement (albeit that it would be temporary associated with construction workers arriving during the construction phase of the Proposed Development) could change patterns of need and demand for health services. This has the potential to affect existing health facilities and services on Lewis and more widely for the Outer Hebrides. These facilities are considered to be of a Low sensitivity as there are several facilities located in the local area.

14.12.4 There is a good provision of medical facilities in close proximity to the Development Site, with no indication that any of these are under-resourced or at capacity. Furthermore, separate accommodation blocks are likely to be provided for the construction workforce during the construction phase of the Proposed Development. Should there be any illnesses within the construction workforce then this would help to contain the spread of any such illness and minimise impacts on the local population. It is considered that the increase in migrant construction workers would result in a Medium magnitude of change, which is considered to result in a minor effect that is not significant.

14.12.5 There is a risk of accidents during the construction works for the Proposed Development which could be detrimental to human health. Appropriate site working practices during the construction works would help to minimise any risk of accidents during the construction and decommissioning phases. Works would be undertaken in accordance with relevant health and safety legislation. A Construction Method Statement (CMS) would be prepared, which would provide an overview of the construction methods that would be for the Proposed Development. This CMS would be submitted to CnES for approval, prior to construction works starting on site. Furthermore, access to the Development Site would be restricted as needed during the construction works and signs would be erected to denote working areas and where it is not safe to access. As such, significant effects in respect of health related to accidents are considered to be unlikely.

Operational Effects

14.12.6 Scottish Public Health Networks in 2015 produced a guide to the Health Impact Assessment of Rural Development[54]. This guide lists sector specific health hazards across a number of sectors. For wind energy the following potential hazards are listed:

- Noise;
- Shadow Flicker;
- Power cables and effects of Electro Magnetic Fields;
- Blade breakage;
- Accidents; and
- Light Pollution.

14.12.7 These potential hazards that may occur during the operation of the Proposed Development are discussed and assessed in further detail below. In addition other health hazards may include for example ice throw from rotating blades. These hazards are addressed in Table 15.8 of the Scoping Request (**Appendix 2A**).

Noise

14.12.8 Wind farm noise assessment is part of an iterative design process, the aim of which is to achieve a design from which noise emissions meet limits derived following the approach given in ETSU-R-97[55] and/or relevant local guidelines. Where this can be achieved, the design of the scheme is such that necessary operational noise limits are met and no additional mitigation measures are required.

14.12.9 **Chapter 12** has assessed the noise effects of the Proposed Development. The results of the assessment demonstrate that there are no significant noise related effects as a result of the Proposed Development. Therefore, there would be no significant noise health effects from the operation of the Proposed Development.

Shadow Flicker

14.12.10 **Chapter 15** has assessed shadow flicker. No shadow flicker effects are expected as no residential properties lie within the area that may be affected by shadow flicker (a distance of 1,550m (10 rotor diameters, plus a 50m micrositing allowance) and 130 degrees either side of north from proposed turbine locations). On this basis there would be no adverse health effects from shadow flicker.

Blade Breakage and Accidents

14.12.11 There is a risk to public health / safety of accidents or blade breakage occurring on site during the operation of the Proposed Development. All turbines would be located at least topple distance away from footpaths to avoid any public health risks should there be any issues with the turbines. Maintenance would be undertaken as needed on the turbine blades to ensure the Proposed Development is operating safely, which would help to reduce the risks of blade breakage occurring. Furthermore, as it is a rural site then general care should be undertaken by members of the public visiting the local area during periods of adverse weather (i.e. in very windy conditions). On this

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[54] Available at: https://www.scotphn.net/wp-content/uploads/2015/10/2015_05_28_SHIIAN_Final_Report.pdf (accessed 28/01/19).
[55] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/49869/ETSU_Full_copy__Searchable_.pdf (accessed 28/01/19).

basis it is not considered that there would be any significant operational health effects from blade breakage or accidents.

Climate Change / Production of Renewable Energy

14.12.12 As highlighted in **Section 14.2** above the Proposed Development would make a contribution to the alleviation of the adverse consequences of global warming. This would be by providing an alternative and renewable source of energy that does not involve the emission of greenhouse gases during operation, compared with the greenhouse gas emissions associated with electricity produced using fossil fuels. Such beneficial effects cannot readily be ascribed to particular individuals or groups, nor the scale of the benefit readily considered other than simply in terms of the amount of power generation and total level of emissions avoided. However, the contribution of renewable energy that provides a net supply of power to the electricity distribution system is considered to be a health benefit as it would help to reduce greenhouse gas emissions. Whilst this health benefit cannot be readily quantified, it is nevertheless considered to be important.

14.12.13 It is predicted that the carbon loss in developing the Proposed Development would be paid back in approximately 1.1 years (4.4% of the 25-year operational life) based upon the fossil fuel mix and the expected outcome (see **Appendix 9H** for calculations and information (Appendix F)).

14.12.14 On the basis of potential annual CO_2 savings of 352,904 tonnes/year (based on figure of 430g of CO_2 savings per kWh and a site specific capacity factor of 47.8%), the Proposed Development could result in a total carbon saving of approximately 8.8M tonnes over its 25 year operational life, and generate electricity to annually supply the equivalent of 229,183 average homes in Scotland (see **Appendix 9H** for calculations and information (Appendix F)).

Power Cables and Effects of Electro Magnetic Fields and Light Pollution

14.12.15 Whilst these issues are identified as potential health effects in the Health Impact Assessment of Rural Development guidance note identified above, these are not assessed any further here. **Section 9.17** of **Chapter 9 Ecology** has assessed power cables and effects of electro-magnetic fields and lighting is addressed in **Appendix 6.D Night Time Visual Assessment**.

Decommissioning Effects

14.12.16 The health effects from decommissioning of the Proposed Development are predicted to be the same or less than its construction effects. Therefore the decommissioning effects are not assessed here any further.

Table 14.15 Summary of Significance of Effects

Receptor and Summary of Predicted Effects	Sensitivity/ Importance/ Value of Receptor[1]	Magnitude of Change[2]	Significance[3]	Summary Rationale
Health – Health Facilities	High	Low	not significant	There would be an influx of construction workers into Lewis for the construction phase of the Proposed Development which could put pressure on the existing health services to the detriment of the existing population. However, there is no indication that the existing facilities are under any significant pressures. It is therefore considered that any effects in relation to health related facilities from construction workers would be minor and not significant.
Health – Health Hazards	High	Low	not significant	As these health hazards have either been assessed in other chapters where the conclusion of effects is 'not significant' or that suitable mitigation can be provided to avoid any significant effects (for example maintenance of turbines to reduce risks of blade breakage), it is considered that any effects in relation to health hazards would be not significant.
Health – Population (Climate Change)	High	N/A	N/A (Not quantifiable)	The contribution of renewable energy that provides a net supply of power to the electricity distribution system is considered to be a health benefit as it would help to reduce greenhouse gas emissions and therefore potentially directly benefit residents on Lewis. Whilst this benefit cannot be readily quantified, it is nevertheless considered to be important.

1. The sensitivity/importance/value of a receptor is defined using the criteria set out in Section 14.10 above and is defined as low, medium and high.
2. The magnitude of change on a receptor resulting from activities relating to the development is defined using the criteria set out in Section 14.10 above and is defined as small, medium and large.
3. The significance of the environmental effects is based on the combination of the sensitivity/importance/value of a receptor and the magnitude of change and is expressed as major (significant), moderate (probably significant) or minor/negligible (not significant), subject to the evaluation methodology outlined in Section 14.10.

14.13 Assessment of Cumulative Effects

14.13.1 Consideration has been given as to whether any of the socio-economic receptors that have been taken forward for assessment in this chapter are likely to be subject to cumulative socio-economic effects in combination with other developments. Other developments on Lewis that have been considered for any cumulative effects includes housing developments, a care home, other wind farms identified in (**Chapter 6**) and a quarry extension.

Population

14.13.2 No cumulative effects on population are predicted which require any further assessment.

Health

14.13.3 No cumulative effects on health are predicted which require any further assessment.

Economy and Employment

14.13.4 **Figure 6.8** illustrates proposed and existing cumulative wind farm schemes within 35km of the Development Site. All phases of these schemes are considered to have the potential to give rise to cumulative socio-economic effects due to their proximity to the Development Site.

14.13.5 Considering the Proposed Development together with existing wind farms nearby, this is likely to generate a beneficial effect for the local economy as a result of local employment and local expenditure throughout all phases of wind farm developments. Given the scale of impacts predicted for the Proposed Development alone, it is considered that there is the potential for **significant** beneficial effect on the local economy when considered specifically in combination with other existing or wind farms within the planning system. The cumulative impact at a national (Scotland) level represents a Low magnitude of change, resulting in a Minor not significant effect.

Recreation & Tourism

14.13.6 There is the potential for cumulative landscape and visual related effects on tourism, recreation and the amenity value of the local area. Details of the cumulative visual effects are set out in **Chapter 6. Table 6.21** demonstrates that the Proposed Development would contribute to some cumulative visual effects for recreation routes (the Sustrans cycle route 780, the Hebridean Way and the Timeless Way) which would be **significant** for these recreational receptors locally whilst Stornoway was operational with other wind farm development. This would be similar to recreational and tourist destinations.

Land Use

14.13.7 No cumulative land use effects are predicted which require any further assessment.

14.14 Consideration of Optional Additional Mitigation or Compensation

14.14.1 The sections below provide an overview of the additional socio-economic benefits which are which would result from the Proposed Development.

Community Benefit Fund

14.14.2 LWP has pledged to provide local community funding which would be delivered during the operational phase of the Proposed Development. In accordance with the Scottish Government's Good Practice Principles for Community Benefits from Onshore Renewable Energy Developments document[56] (2013, revised in 2015 for factual accuracy), this funding aims to ensure that local communities share the socio-economic benefits which would be generated from the Proposed Development.

14.14.3 The Proposed Development would make an annual payment of £5,000 (index-linked) per MW over the life time of the project. As an example, a 196MW scheme would mean an annual payment of over £980,000 per annum for the local community to invest in local projects and priorities.

14.14.4 There would be greater economic impact where the funds are invested in local economic activity (for example business support) rather than on community based activities (e.g. playgrounds and parks).

14.14.5 The socio-economic assessment in the ES for the Stornoway Wind Farm 2012 drew on analysis commissioned by CnES on the economic impact of community benefit funds, which estimated that that one job would be created for one year per £80,000 of capital expenditure, while revenue expenditure of £35,000 would support one new job for one year. On the basis of those figures it is estimated that capital expenditure of up to £353m would support up to 4,412.5[57] jobs throughout the lifetime of the Proposed Development.

Community Ownership

14.14.6 Scottish Government policy has acknowledged the potential for the local ownership model as a means of potentially increasing the benefits falling to rural economies. LWP has offered the local community a right to acquire up to 20% of the Proposed Development, effectively bringing up to 39.2MW into local social ownership assuming 196MW of installed capacity.

14.14.7 Factors which would contribute to the profitability of the Proposed Development include the price of electricity, wind speed, turbine performance and grid connection charges. As with any business, the local community would be required to invest into such a venture if they believe that the financial rewards for doing so are adequate.

14.14.8 Assuming that the local community is able to access finance on reasonable terms to take up this right to acquire a share of the Proposed Development, the profits generated under a best case scenario could provide a multi-million pound surplus within the local community. However, given that there is uncertainty over a wide range of factors including the community accessing finance, the transmission charging regime and capital expenditure, it is difficult to estimate with any certainty the potential scale of these benefits.

14.14.9 LWP is in discussions with CnES and the Stornoway Trust regarding the possibility of a Joint Acquisition of up to 20% of the Proposed Development. Discussions remain positive and ongoing.

Recreational Access Improvements

14.14.10 Once operational, the Development Site would offer improved access, through the construction of 28.7km of new access tracks and 13 new watercourse crossings.

[56] Available at: https://www2.gov.scot/resource/0043/00438782.pdf (Accessed 28/01/19).
[57] £353m divided by £80,000.

14.15 Conclusions of Significance Evaluation

14.15.1 The assessment presented in this chapter demonstrates that the Proposed Development would potentially result in **significant** temporary, beneficial local (Council ward level) economic effects during construction and as a result of the community benefit fund (during operation). Residual economic effects during operation and decommissioning would be beneficial, but not significant at a national level. Additional economic, employment and land use effects during construction and decommissioning of the Proposed Development would be beneficial but not significant. There would be some **significant** effects on tourism and recreation receptors locally in terms of Core Path 6, Sustrans cycle route 780, the Hebridean Way and the Timeless Way. Health effects are considered to be not significant.

14.16 Implementation of Environmental Measures

14.16.1 **Table 14.18** below describes the environmental measures embedded within the Proposed Development that are considered to be of relevance to this socio-economic assessment and the means by which they would be implemented, i.e. they would be secured through planning conditions.

Table 14.16 Summary of Environmental Measures to be Implemented – Relating to Socio Economics

Environmental Measure	Responsibility for Implementation	Compliance Mechanism
Construction Access Management Plan	The Developer	Planning Condition

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15. Shadow Flicker

Non-Technical Summary

Under certain combinations of geographical position, time of day and time of year, the sun may pass behind the rotor of a wind turbine and cast a shadow over neighbouring properties. When the blades rotate, the shadow moves across the ground. Where the shadow is cast through a window or an open door, it may appear to flicker on and off, this is known as 'shadow flicker'.

Experience has shown that shadow flicker has the potential to cause annoyance to occupants of affected properties under certain circumstances. A study has therefore been undertaken to identify whether shadow flicker is likely to occur at residential properties in the vicinity of the Proposed Development. At UK latitudes, shadow flicker effects are only likely to occur at properties within 10 rotor diameters of a turbine where they are located within 130 degrees either side of north of any turbine.

As there are no residential properties located within 1,550m (10 rotor diameters of up to 150m, plus 50m mircositing) and 130 degrees either side of north of any turbine, shadow flicker was not predicted to occur at any of the nearby residential properties as a result of the Proposed Development.

15.1 Introduction

15.1.1 This chapter sets out the relevant legislation and guidance relating to shadow flicker and identifies a zone of influence to assess whether shadow flicker, either from the Proposed Development or cumulatively with other wind turbine developments, would have a likely significant effect on properties.

15.2 Limitations of this Assessment

15.2.1 There are no limitations relating to shadow flicker that affect the robustness of the assessment of the potential likely significant effects of the proposed development.

15.3 Policy and Legislative Context

15.3.1 There is no legislation setting out any relevant rules or requirements for the assessment or control of shadow flicker.

15.3.2 Scottish Planning Policy (SPP) (Scottish Government, 2014), under the subject of policy on onshore wind, lists shadow flicker as an assessment criteria for wind farm developments relevant for consideration when assessing the impact of energy infrastructure developments on dwellings.

15.3.3 Advice is provided in the Scottish Government's Online Renewables Planning Advice: Onshore Wind Turbines (2014) [1], which states that: *"Under certain combinations of geographical position, time of day and time of year, the sun may pass behind the rotor and cast a shadow over neighbouring properties. When the blades rotate, the shadow flicks on and off; the effect is known as shadow flicker. It occurs only within buildings where the flicker appears through a narrow window opening"*.

[1] https://www.gov.scot/publications/onshore-wind-turbines-planning-advice/

15.3.4 The Onshore Wind Turbines: Planning Advice (2014) goes on to state: *"In most cases however, where separation is provided between wind turbines and nearby dwellings (as a general rule 10 rotor diameters), "shadow flicker" should not be a problem"*.

15.3.5 There is no specific guidance on assessment methodology within the Online Renewables Planning Advice: Onshore Wind Turbines (2014). The assessment criteria within the Online Renewables Planning Advice: Onshore Wind Turbines is based on the now revoked PPS 22 Companion Guide (ODPM, 2004) for England and Wales. This guide informed current Scottish advice (that shadow flicker impacts within 130 degrees either side of north be assessed within a 10 rotor diameter distance from the nearest property) and formed part of the Shadow Flicker study carried out by the Department of Energy and Climate Change (DECC) in 2011. The recommendations in PPS 22 Companion Guide (OPM, 2004) were the subject of a study commissioned by the Department of Energy and Climate Change (DECC) in 2011 entitled *An Update of UK Shadow Flicker Evidence Base*. The purpose of this study was to present *"an update of the evidence base which has been produced by carrying out a thorough review of international guidance on shadow flicker, an academic literature review and by investigating current assessment methodologies employed by developers and case study evidence"*.

15.3.6 The findings of the DECC study concluded that the recommendations within English and Scottish planning policy and advice to assess shadow flicker impacts within 130 degrees either side of north and 10 rotor diameter distance from the nearest property is appropriate. This guidance is based on the path of the sun across the UK and the potential length of shadows. The study also concluded that it is widely accepted across Europe that, at more than 10 rotor diameters from a turbine, the potential for shadow flicker is very low.

15.3.7 It should be noted that at the time of this study, national policy guidance was presented in Planning Advice Note (PAN) 45 *Renewable Energy Technologies* for Scotland and *Planning for Renewable Energy, A Companion Guide* to Planning Policy Statement (PPS) 22 (ODPM, 2004) for England and Wales. Both of these documents have since been revoked and current national guidance on Shadow Flicker is available within Online Renewables Planning Advice: *Onshore Wind Turbines* (Scottish Government, updated May 2014) and the National Policy Statement (NPS) for *Renewable Energy Infrastructure* (EN-3) (DECC, 2011) respectively. NPS-EN3 generally only applies to renewable energy development in England and Wales.

15.3.8 Despite these changes in national planning policy frameworks, the content of the policy guidance regarding the assessment of shadow flicker effects has not altered since the DECC study in 2011. Furthermore, the 2011 study concluded that there have not been extensive issues with shadow flicker in the UK and, in circumstances where the potential for significant shadow flicker effects have been identified, these have been resolved using standard mitigation, such as turbine shut down systems. Following publication of the 2011 study, DECC has confirmed that there are no plans to change current guidance on shadow flicker. Furthermore, no guidance has been issued in Scotland to update this to date.

15.3.9 The current statutory development plan applicable to the Development Site comprises the Outer Hebrides Local Development Plan, adopted by Comhairle nan Eilean Siar in November 2018. Full details regarding all relevant national and development planning policies, including emerging policies, are provided in **Chapter 5: Legislative and policy overview,** together with information regarding other material planning considerations.

15.3.10 Additional guidance is found in Supplementary Planning Guidance (SPG) Wind Energy, adopted by Comhairle nan Eilean Siar Council in November 2018

15.3.11 **Table 15.1** below sets out applicable national and Development Plan policies related to shadow flicker.

Table 15.1 Policy Issues Considered in Preparing the Shadow Flicker Assessment

Policy reference	Policy issues
Scottish Planning Policy (2014)	Paragraph 169 identifies a number of considerations which are likely to be relevant when determining proposed energy infrastructure developments, including: • *"Cumulative impacts …* • *Impacts on communities and individual dwellings, including visual impact, residential amenity,* • *Noise and shadow flicker…".*
National Policy Statement for Renewable Energy Infrastructure (EN3) July 2011	National Policy Statement for Renewable Energy Infrastructure (EN3) includes a fuller description of the effect of shadow flicker and more detailed guidance. Paragraph 2.7.63 of EN3 describes shadow flicker as: *"…the effect caused when an operating turbine is located between the sun and a receptor, such as a dwelling or place of work.* *The effect occurs when the shadow of the rotating blades falls over the dwelling causing the light intensity within specific affected rooms of the occupied building to fluctuate."* Paragraph 2.7.64 sets out the factors affecting the potential significance of the effect and goes on to state: *"Research and computer modelling on flicker effects has demonstrated that there is unlikely to be a significant impact at distances greater than ten rotor diameters from a turbine. Therefore, if the turbine has 90 m diameter blades, the potentially significant shadow flicker effect could be observed up to 900 m from a turbine."* With regard to the requirements of the applicant's assessment, paragraph 2.7.66 states: *"Where wind turbines have been proposed within 10 rotor diameters of an existing occupied building, a shadow flicker assessment should be carried out by the applicant.* *The IPC should anticipate that the intensity of the shadow of the rotating blades from turbines at distances from such buildings of 10 rotor diameters and beyond is sufficiently diminished so as to have no significant impact on occupied buildings."* With regard to human health, paragraph 2.7.70 states: *"The maximum frequency of the shadowing effect from commercial scale wind turbines is less than 1 hertz, which is well below the frequency known to affect sufferers of epilepsy (which is above 2.5 hertz). Therefore, shadow flicker frequencies are not in the region known to induce seizures in sufferers of epilepsy, and as such, where the frequency of potential flashes will not exceed 2.5 hertz the [Secretary of State] should give very limited weight to any claims of effects on epileptics from onshore wind turbines."*
Outer Hebrides Local Development Plan (LDP) November 2018	Policy EI 8: Energy and Heat Resources This policy states: *"Development proposals for all scales of onshore wind energy development will be assessed against the Supplementary Guidance for Wind Energy Development."* It also states: *"Proposals for all other renewable energy projects and oil and gas operations (including land based infrastructure associated with offshore projects) will be required to demonstrate all the following:* a) *appropriate location, siting and design including the technical rationale for the choice of site;* b) *no significant adverse impact (including cumulative) on: landscape, townscape and visual aspects; natural, built and cultural heritage resources; the water environment; peatlands; aviation, defence and telecommunications transmitting and receiving systems, e.g., broadband; public health and safety, and amenity (including noise); neighbouring land uses, transport management and core paths;* c) *appropriate decommissioning and site reinstatement arrangements;* d) *phasing arrangements, where appropriate;*

Policy reference	Policy issues
	e) *the contribution towards meeting national energy supply targets and local economic impact."*
Comhairle nan Eilean Siar Supplementary Guidance – Wind Energy November 2018	The SPG states: *"Planning applications for wind farms must be accompanied by evidence that the proposals have been assessed and found to have no unacceptable significant adverse impact on community amenity in relation to the following:* • Shadow flicker;" It also states: *"With regards to shadow flicker and as per Scottish Government advice, turbines should be located at least a minimum distance equivalent to 10 times the blade diameter from any regularly occupied buildings not associated with the development and at least a minimum distance equivalent to the height of the turbine to blade tip plus 10% from public roads or paths identified in the Outer Hebrides Core Paths Plan."*

Photo Sensitive Epilepsy

15.3.12 Research has been carried out to determine whether shadow flicker from wind turbines can cause seizures in photo-sensitive epilepsy sufferers (e.g. Harding G, Harding P, and Wilkins A, [2008]: Wind turbine, flicker, and photosensitive epilepsy: Characterizing the flashing that may precipitate seizures and optimizing guidelines to prevent them. Epilepsia, 49[6]). Sufferers are usually sensitive to flickering light at frequencies from 3Hz–60Hz. For a typical 3-blade, 150m rotor diameter wind turbine the maximum rotational speed will be less than 20 revolutions per minute (rpm) so the blade passing frequency is 60rpm, or 1Hz; this is well below the 3Hz–60Hz sensitivity range.

15.3.13 The turbine models which fit the project envelope would operate at varying speeds, up to 12 RPM. As the turbine rotors would have three blades, each blade would pass a particular point no more than 36 times a minute, which equates to a maximum frequency of 0.6 Hertz. This is much lower than the 3-30 Hertz frequency range generally thought to risk triggering photo-sensitive epilepsy. It is also noted in the DECC Report (2011) that *"on health effects and nuisance of the shadow flicker effect, it is considered that the frequency of the flickering caused by the wind turbine rotation is such that it should not cause a significant risk to health"*.

15.3.14 Therefore photo-sensitive epilepsy is scoped out and is not considered further in this assessment as there is no likelihood of any significant effect.

15.4 Data gathering methodology

15.4.1 The following sources of information outlined in **Table 15.2** were used to inform this Chapter.

Table 15.2 Sources of Information

Topic	Source of information
Residential properties	
Location in relation to Proposed Development and identification of windows.	Ordnance Survey (OS) 1:25,000 Mapping Google Earth Street View Bing Maps Birds Eye View

Topic	Source of information
Topography	
Height data	OS 5m DTM data

15.5 Overall Baseline

15.5.1 As outlined in **Section 15.3** it is considered that shadow flicker would not have a significant impact at properties located at a distance greater than ten rotor diameters from the wind turbines. The turbines under consideration for the Proposed Development have rotor diameters of up to 136m and 150m, which would correspond to a study area of 1,360m and 1,500m respectively. In order to simplify the assessment, it is assumed that each turbine would have a 150m rotor diameter (although 10 turbines would have a maximum rotor of 136m, as per **Chapter 4**). In addition, 50m has been allowed for micrositing, giving a total study area of 1,550m.

15.5.2 Properties falling within this baseline will be assessed with regards to the potential to experience shadow flicker. The study area is shown in **Figure 15.1**. Based on the assessment criteria outlined in **Section 15.3,** no receptors have been identified within this study area.

15.6 Predicted Effects: Shadow Flicker

15.6.1 No shadow flicker effects are expected as no residential properties lie within a distance of 1,550m (10 rotor diameters, plus a 50m micrositing allowance) and 130 degrees either side of north from proposed turbine locations. The study area is shown in **Figure 15.1**.

15.7 Cumulative Effects

15.7.1 Two operational wind farms are located close to the Development Site: Beinn Greidaig and Pentland Road.

15.7.2 Beinn Greidaig is an operational wind farm situated within the Development Site boundary. The closest turbine is located 420m from Turbine 18 of the Proposed Development. The wind farm has turbines with 82m rotor diameter.

15.7.3 Although there is potential for the shadow flicker study area to overlap with that of the Beinn Greidaig turbines, no residential properties fall within the overlapping study areas and so no cumulative effects would occur, as seen in **Figure 15.1.**

15.7.4 Pentland Road is an operational wind farm situated to the north west of the Development Site. The closest turbine is located 760m from Turbine 25 of the Proposed Development. The wind farm has wind turbines with 82m rotor diameter.

15.7.5 Although there is potential for the shadow flicker study area to overlap with that of the Pentland Road turbines, no residential properties fall within the overlapping study areas and so no cumulative effects would occur, as seen in **Figure 15.1.**

15.7.6 Both existing wind farms that could have the potential for cumulative effects with the Proposed Development have been assessed for this potential with regards to the relevant study areas. No other operational or consented wind turbine development has been considered further, as they are beyond the study area. It has been confirmed that as no residential properties would be affected, therefore it is not necessary to undertake further assessment for cumulative effects.

15.8 Mitigation and Enhancement Measures

15.8.1 No mitigation measures would be required since no predicted shadow flicker effects have been identified.

15.9 References

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16. Summary of Mitigation Measures

16.1.1 This chapter provides a summary of the mitigation and enhancement measures proposed for the construction works and for the operation of the Proposed Development as set out in each of the technical chapters. Decommissioning associated with the Proposed Development would be the subject of a planning condition should consent be granted.

16.1.2 **Table 16.1** summarises the environmental measures that form part of the Proposed Development, as well as the mechanisms which would be used to ensure that these measures are implemented as part of the Proposed Development. Greater detail on these measures can be found in each of the technical assessment chapters.

Table 16.1 Summary of Environmental Measures to be Implemented

Environmental Measure and Rationale	Responsibility for Implementation	Compliance Mechanism	EIA Report Section Reference
General Construction			
A Construction Environmental Management Plan (CEMP) would be provided prior to construction. It would be the master document for consolidating all environmental requirements and undertakings that emerge from any individual management plans which may be produced for the project, such as a Habitat Management Plan, Waste Management Plan, Peat Management Plan, etc and would clearly outline what should be implemented, where, and by whom. The CEMP would be the main document used by the Environmental Clerk of Works (ECoW) when carrying out audits of planning and environmental compliance. It would be made available to the appointed civil engineers and construction company. General provisions include: • The application of good practice; • Completion and implementation of a Construction Method Statement (CMS); • Completion and implementation of a detailed Site Waste Management Plan (SWMP); • Completion of a Transport Management Plan (TMP) presenting a strategy for communication with local residents and businesses, detailed traffic management strategies; road traffic signage arrangements; road condition survey pre and post construction, etc.; • Completion and implementation of a Water Management Plan (WMP) (specific mitigation measures set out in **Chapter 11**); • Completion and implementation of a detailed Peat Management Plan (PMP) (**Appendix 9H**); • Completion and implementation of a Habitat Management Plan (**Appendix 9I**); • Completion and implementation of a Pollution Prevention Plan (PPP) and Pollution Incident Response Plan (PIRP) ;and • Environmental measures to be implemented to control dust emissions during construction.	Developer / Contractor	Planning condition / contract requirement	Section 4.7
The construction works would require an overall CMS to set out overriding construction principles, programme and health and safety requirements etc. The overall CMS would be agreed with CnES in advance of commencement of development. Additional CMSs corresponding to individual construction activities would also be prepared. The key measures that would be implemented, as part of the CMS and the supporting CEMP, in order to avoid or reduce potential construction effects, include: • The selective and sensitive location of temporary storage areas for materials, plant and security fencing;	Developer / Contractor	Planning Condition	Section 4.4 Section 6.5

Environmental Measure and Rationale	Responsibility for Implementation	Compliance Mechanism	EIA Report Section Reference
• Use of designated routes around the site for construction vehicles and operation of construction plant. Avoiding the creation of any 'wheel ruts' or related damage to land and vegetation, and subsequent clear up or repair of these; • Implementation and monitoring of site management procedures, such as regular litter sweeps to ensure the removal of all litter arising from the construction activities; and • Reinstatement of all temporary construction compounds, site offices, areas of former hardstanding, parking areas and any related temporary construction facilities.			
Road widening works would be carried out along the abnormal load delivery route. Details of which are set out in **Appendix 13A**.			Section 4.3 Appendix 13A
Further Geotechnical Investigation (GI) would be undertaken to determine detailed ground conditions along tracks and at construction compound and wind farm substations locations. This information would inform the detailed track design, the turbine foundation design and identify any micro-siting requirements.	Development / Contractor	Contract requirement	Section 4.4
An Environmental Clerk of Works (ECoW) would be appointed prior to construction and employed for the duration of construction related works (including post construction restoration). The role of the EcoW would be to manage the effects of construction works on the environment, make sure that the mitigation measures required as part of the EIA are implemented in accordance with the documents. The ECoW may change depending on technical requirements (i.e., a hydrologist would be used to confirm compliance with the PPP, an ecologist would be used to give tool box talks regarding otter mitigation, or an archaeologist used to define the areas to be fenced off to protect heritage features.	Developer / Contractor	Planning Condition / Contract requirement	Section 4.4
Following completion of construction, borrow pits would be restored to ensure that the ground is stable., safe and improve their visual appearance. A detailed plan for the restoration of each borrow pit would be developed and agreed with CnES, drawing upon the advice of a landscape architect and an ecologist, to the proposed reinstatement materials and techniques are suitable. It is anticipated that steep faces would be graded out to fit with the surrounding topography and disturbed surfaces covered with soil and re-seeded or re-turfed.	Developer / Contractor	Planning Condition	Section 4.5 Section 6.6
Micro-siting of up to 50m for wind turbines and 100m for internal wind farm tracks and other infrastructure such as substations and compound to avoid environmental, geotechnical and health and safety sensitivities. This mitigation may be restricted further in terms of specific locational hard constraints such as not micrositing closer to water course if within 50m of a water course or not encroaching beyond the agreed Fresnel zone of microwave link.	Developer / Contractor	Planning Condition	Section 4.5

Environmental Measure and Rationale	Responsibility for Implementation	Compliance Mechanism	EIA Report Section Reference
Rock anchor foundation systems would be implemented where possible to minimise peat removal and significantly reduce concrete use. Where this is not possible, the traditional, gravity foundation design, would be implemented.	Developer / Contractor	CEMP	Section 4.5
Internal wind farm tracks would be floated (using either option A or option B) normally where the peat depth is greater than 1m, otherwise the tracks would be excavated and backfilled. Submerged drainage pipes would be installed across excavated tracks where hydrological sensitivities are present. The floating tracks would be constructed in line with the good practice guidance. and would include the use of geogrids.	Developer / Contractor	Planning Condition	Section 4.5
Two main types of watercourse crossing are proposed for the development: bridges and culverts. The use of each of these types of structures would be determined individually to minimise potential effects based on a site-specific assessment, which would account of topographic, hydrological and ecological attributes at each proposed crossing point. All watercourse crossings would be designed in accordance with the SEPA Good Practice Guide for the Construction of River Crossings and, where culverts are required, they will be design in accordance with the CIRIA Culvert Design and Operation Guide. All river crossings would be designed to convey a 1 in 200-year return period flood event, and individually sized and designed to suit the specific requirements and constraints of its location.	Developer / Contractor	Planning Condition	Section 4.5 Section 9.8
The constructions compounds would be lit with security lighting, which would face inwards to minimise light pollution.	Developer / Contractor	Planning Condition	Section 4.5
The construction compounds may be enclosed within a security fence around the perimeter and the access to substations and electrical compounds would be via a locked access gate.	Developer / Contractor	Planning Condition	Section 4.5
The operation of the Proposed Development would cover a period of up to 25 years.	Developer	Planning Condition	Section 4.6 Section 6.5
A comprehensive plan for the decommissioning (including environmental management practices) of the Proposed Development and restoration plan of the Development Site on completion of decommissioning works would be prepared for agreement with CnES.	Developer	Planning Condition	Section 4.6 Section 6.6

Environmental Measure and Rationale	Responsibility for Implementation	Compliance Mechanism	EIA Report Section Reference
The decommissioning plan would be prepared near the end of the operational life of the Proposed Development to decommission the Development Site and restore the landform after removal of the above ground infrastructure. As part of the decommissioning of the wind farm, all visible, above ground structures (turbines, transformers, main and secondary substations) would be removed and any disturbed areas reinstated. Some wind farm tracks may remain in perpetuity, for use by landowners and walkers, creating an enhancement opportunity.			
Landscape and Visual			
Wind turbines would 3-bladed and painted in a neutral colour (colour specification, light grey RAL 7035) with a semi-matt finish with no logos so as to minimise the visual intrusion. Redundant hardstanding areas would be reinstated post construction.	Developer	Planning Condition	Section 4.5 Section 6.5
All turbines of 150m or greater in height to blade tip would be lit at the highest point on the nacelle or hub and on three sides of the tower at half the hub height to ensure aviation safety.	Developer / Contractor	Planning Condition	Section 6.5
At the earliest opportunity on completion of erection of turbines, the edges of wind farm tracks would be re-turfed with peat and encouraged to re-generate to reduce local visual impact during the operational period.	Developer / Contractor	Planning Condition	Section 6.5
The operation of the Proposed Development would cover a period of up to 25 years and include site management to ensure the adequate maintenance of site facilities and landscape features such as access tracks, field boundaries, gates and signage.	Developer / Contractor	Planning Condition	Section 6.5
In order to maintain the amenity and simplicity of the Boggy Moorland, the colour of the control buildings (including battery and switchgear containers) would be co-ordinated with the colour selected to have a low contrast with the surrounding moorland. The development would be enclosed by a 2.7m high perimeter fence with a low visibility style and colour.	Developer / Contractor	Planning Condition	Section 6.6
The proposed areas identified in Figure 9G.1 (potential habitat enhancement search areas) would be planted with native species which would enhance the landscape character of the Boggy Moorland or provide additional habitat for hen harrier. This would be subject to agreement with SNH.	Developer / Contractor	Planning Condition	Section 6.6
Historic Environment			
Mitigation of adverse direct effects would be provided by the agreement of a written scheme of archaeological works with the CnES Archaeologist.	Developer / Contractor	Planning Condition	Section 7.13

Environmental Measure and Rationale	Responsibility for Implementation	Compliance Mechanism	EIA Report Section Reference
This scheme would allow for the identification and recording of archaeological features and deposits of geoarchaeological and paleoenvironmental interest within the Development Site which would otherwise be affected by the Proposed Development.			
Ornithology			
The following measures would be incorporated into the Proposed Development in order to minimise construction and decommissioning effects to breeding or roosting bird species: • As part of an overarching CEMP, a Bird Protection Plan (BPP) would be developed in consultation with the relevant consultees in advance of construction works commencing. Construction Method Statements (CMSs) would be developed to detail the mitigation approach for all bird receptors. These would cover the site and receptor specific requirements of the embedded mitigation as outlined in **Section 8.8;** • Site supervision would be provided by a suitable experienced ECoW, who would be responsible for ensuring the successful implementation of embedded measures, including pollution prevention, monitoring of buffers around construction areas and reference to areas of high ecological sensitivity, and adherence to current construction best practice; • Pre-construction verification check surveys would be undertaken for all protected bird species where potential significant effects or legal breaches could occur otherwise; • Maintain species specific buffers detailed in the BPPs from nests during the breeding or roosting season until young fledge or method statements would be developed outlining the method to allow works to continue within buffer areas where appropriate. For example, in some cases, there may be a requirement to install screening around working areas to allow it to continue within a buffer area. An ornithologist may be required to monitor the nesting birds during the working phase in certain areas and halt any significantly disturbing activities in consultation with the ECoW; • An emergency procedure would be implemented by site workers if a nest of a breeding bird is encountered. All works within 100m would cease as soon as it is safe to do so, and the ECoW would inspect the site and define appropriate measures (if required); • When construction activities are taking place at more than one location at any one time, this would be subject to ECoW approval, to avoid any cumulative impact on breeding bird activity; • A Habitat Management Plan (HMP) would also be implemented with the aim of ensuring continued growth of the hen harrier population within and outside of the Development Site.	Developer / Contractor	Planning Condition	Section 8.8

Environmental Measure and Rationale	Responsibility for Implementation	Compliance Mechanism	EIA Report Section Reference
A key objective would be to minimise the extent of tree removal from within the Development Site during the construction works (embedded mitigation), and then manage the remaining trees on site during operation. The HMP would be developed in consultation with SNH, and require to be approved, prior to the start of construction.			
Mitigation to minimise the effects of operational disturbance would be expected to be of a similar nature to construction where impacts and thus effects occur, but proportionally reduced in scale.	Developer / Contractor	Planning Condition	Section 8.8
A construction area stand-off of at least 50m has been applied to all watercourses and water bodies (except for watercourse crossings). All watercourse crossings would be designed in accordance with the SEPA Good Practice Guide for the Construction of River Crossings (2010) and, where culverts are required, have been designed in accordance with the CIRIA Culvert Design and Operation Guide (2010).	Developer / Contractor	Planning Condition	Section 8.8
A Pollution Prevention Plan (PPP) and Pollution Incident Response Plan (PIRP) would be prepared and subject to consultation with SEPA and SNH in advance of any construction activities and implemented as part of the overall CEMP. The PPP would set out site management and working practices and draw heavily upon SEPA's Pollution Prevention and Control Guidelines (PPGs).	Developer / Contractor	Planning Condition	Section 4.7 Section 8.8 Section 9.8
Ecology			
Tight construction footprints would be adhered to in order to minimise damage to sensitive habitats. Foundations of all turbines would be excavated to bedrock (using either rock anchor, rock cage or excavation methods) and all access tracks on peat depths exceeding 1m would be of floating design (either option A or Option B), to minimise effects on peat.	Developer / Contractor	CEMP CMS EMP PMP	Section 9.8
The following measures would be incorporated in order to minimise construction effects to sensitive blanket bog habitats: • As part of an overarching Construction Environmental Management Plan (CEMP), a Peat Management Plan (PMP) would be developed and agreed (based on **Appendix 9H**), in consultation with the Project Ecologist and the relevant consultees, in advance of construction works commencing. This would include the method of removal and storage for vegetated turves and peat together with best practice reinstatement and restoration measures for the re-use of excavated peat within the Development Site;	Developer / Contractor	Planning Condition	Section 9.8

Environmental Measure and Rationale	Responsibility for Implementation	Compliance Mechanism	EIA Report Section Reference
• Site supervision would be provided by a suitably experienced Environmental Clerk of Works (ECoW), who would be responsible for ensuring the successful implementation of embedded measures, including pollution prevention (see below), monitoring of buffers around construction areas and reference to areas of high ecological sensitivity, and adherence to current construction best practice; • Pre-construction surveys of all works areas over blanket bog would be undertaken by a suitably qualified ECoW in order to identify locations of any rare bog species (notably *Sphagnum Austinii*) and propose suitable avoidance buffers; • A Habitat Management Plan (HMP) would also be implemented with the aim of ensuring successful restoration and reinstatement of affected blanket bog and wet heath within the Development Site. The HMP would be developed in consultation with SNH and SEPA, and require to be approved by both, prior to the start of construction.			
The following measures would be incorporated in order to minimise the risk of pollution and to ensure that impacts on watercourses are either avoided or reduced: • A Pollution Prevention Plan (PPP) and Pollution Incident Response Plan (PIRP) would be agreed with relevant bodies in advance of any construction activities and implemented as part of the overall CEMP. This would set out site management and working practices and draw heavily upon SEPA's Pollution Prevention and Control Guidelines (PPGs); • All watercourse crossings would be designed in accordance with the SEPA Good Practice Guide for the Construction of River Crossings and, where culverts are required, have been designed in accordance with the CIRIA Culvert Design and Operation Guide; • Bridge construction would be undertaken by vehicles operating from the bankside rather than in the watercourse; and • A construction area stand-off of at least 50m has been applied to all watercourses (except for watercourse crossing.	Developer / Contractor	Planning Condition	Section 4.5 Section 8.9 Section 9.8
The following measures would be incorporated to minimise both the obstruction of migration and associated adverse effect on fish spawning and recruitment and the risk of harm to fish during works at watercourse crossings: • Watercourse crossing designs/construction would be informed by SEPA Good Practice Guide for the Construction of River Crossings (SEPA 2010b) and CIRIA Culvert Design and Operation Guide (CIRIA 2010). Bridged watercourse crossings would be used where feasible/practicable. Where this is impracticable, bottomless culverts will be used, having the benefit over more conventional culverts of maintaining the existing channel bed, substrate and hydromorphology;	Developer / Contractor	Planning Condition	Section 9.8

Environmental Measure and Rationale	Responsibility for Implementation	Compliance Mechanism	EIA Report Section Reference
• Culverts/bridges would be installed (and decommissioned) from the bank, in low flows, outside the period October to May inclusive and where possible during the period July to September inclusive. This timing restriction would apply to any construction/excavation work within 30m of watercourses; • Any damming/over-pumping during work on watercourse crossings would be accompanied by a fish rescue scheme under the supervision of an ECoW; • Culverts would be subject to a programme of inspection throughout the construction and operation of the Proposed Development; • An integrated fish, freshwater invertebrate and water quality and river habitat monitoring plan would be prepared and implemented by an experienced ecologist to monitor the effects of the construction and decommissioning of the Proposed Development on freshwater ecology.			
Watercourse crossing would be micro-sited to avoid unconsolidated gravel and pebble substrates and riffle habitats. Culverts would be a single pipe structure i.e. not comprising multiple pipes. Culverts would be full pipes where the base would be covered with a natural bed. Culvert construction would be supervised by the ECoW, with culverts transferred to watercourse crossings intact, avoiding mixing concrete near to watercourse crossings. With the exception of work at watercourse crossings a buffer/exclusion zone (50m radius) around watercourses would be implemented. This would be required to minimise the loss / severance of, or damage to, watercourse habitat at watercourse crossings, including associated adverse effects on fish spawning and recruitment.	Development / Contractor	Planning Condition	Section 4.5 Section 9.8
With the exception of work at watercourse crossings, a buffer/exclusion zone (50m radius) around the watercourse network would be implemented. Additional measures to minimise the risk of pollution sediment release to watercourses are set out in detail in **Chapter 11**. These include for example: avoiding construction activity and temporary or permanent infrastructure in flood zones, steeper gradients and areas at risk of peat slide. Drainage designs and a Peat Management Plan and Water Management Plan would avoid silt-laden run-off entering watercourses, directing drainage away from watercourses. Dewatering designs would allow collection and settlement of suspended sediment (silt traps, fences, straw bales or where necessary swales and settlement lagoons). A PPP and PIRP would be implemented as part of the CEMP. **T**he ECoW would inspect all dewatering regularly and get any identified defects fixed within a day. This would be required to minimise silt / sediment and pollutant release, damaging fish habitats (including spawning habitat), potentially harming fish and associated adverse effects on fish populations.	Developer / Contractor	Planning Condition	Section 9.8

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Environmental Measure and Rationale	Responsibility for Implementation	Compliance Mechanism	EIA Report Section Reference
With exception of watercourse crossing (construction and operation), a buffer/exclusion zone (50m radius) around the watercourse network would be implemented, which would minimise noise/vibration effects on fish. Culverts would be installed (and decommissioned) from the bank, in low flows, outside the period October to May inclusive and where possible during the period July to September inclusive to avoid sensitive periods for fish. This timing restriction would also apply to any construction/ excavation work within 30m of watercourses. Construction of watercourse crossings would be completed over a period of short duration and taking care to minimise noise/vibration, such as avoiding impacts between plant and river bed/bank substrate and carefully lowering culverts into place. Other measures to be implemented as part of good site working practice to restrict noise emissions are detailed in **Chapter 12: Noise**. This would be required to minimised noise and vibration associated harm to fish.	Developer / Contractor	Planning Condition	Section 9.8
Each watercourse crossing would be inspected for freshwater pearl mussels in advance of construction, extending 50m upstream and downstream. In the unlikely event that freshwater pearl mussel is recorded, the crossing would be micro-sited to avoid this species in consultation with SNH. The measures set out above to minimise effects on fish would also minimise effects of changes in downstream water quality on freshwater invertebrates. This would be required to minimise disturbance / harm to freshwater pearl mussel and other freshwater invertebrates due to habitat degradation and disturbance.	Developer / Contractor	Planning Condition	Section 9.8
A Tree Removal Plan would be required along with a felling licence.	Developer / Contractor	Planning Condition	Section 9.8
A Species Protection Plan (SPP) for otter would be prepared to ensure compliance with legislation. It would include details of pre-construction surveys to check on the presence of otters and the following suite of embedded measures that would be implemented across the Development Site to avoid causing harm to, or disturbing this species: • During normal working hours throughout the construction period the ECoW would be onsite to ensure that all environmental measures relevant to otter are delivered and ensure compliance with legislation; • No working or artificial lighting within 50m of watercourses/ waterbodies during the hours of darkness, taken to be 30 minutes before sunset to 30 minutes after sunrise, unless specifically agreed with SNH; • All works in proximity to waterbodies / watercourses would follow measures outlined in the CEMP to ensure their complete protection against pollution, silting and erosion as further outlined in the PPP and PIRP;	Developer / Contractor	Planning Condition	Section 9.8

Environmental Measure and Rationale	Responsibility for Implementation	Compliance Mechanism	EIA Report Section Reference
• Culverts would be fitted with mammal ledges and a suitably textured ramp extending to the level of the road; • Strict speed limits would be followed on access tracks during all phases of development, and 'otter crossing' signs would be placed on the access tracks at all water crossings; • Trenches, holes and pits would be kept covered at night or provide a means of escape for otters (and other fauna) that may become entrapped. Gates to compound areas would be designed sensitively to prevent mammals from gaining access and would be closed at night. Any temporarily exposed pipes would be capped when contractors are off site to prevent otter from gaining access; • Any lighting used to accommodate such works must be positioned to minimise light spill onto watercourses/ waterbodies and would be subject to ECoW approval. The ECoW would monitor otter activity upstream and downstream of the works using camera traps and may stop site activities at any time should they consider that the works are having a detrimental affect on otter; • An emergency procedure would be implemented by site workers if otter are encountered. All works within 30m would cease as soon as it is safe to do so, and the ECoW would inspect the site and define appropriate measures (if required); and Should construction activities take place at more than one watercourse at any one time, this would be subject to ECoW approval, to avoid any cumulative impact on otter activity. This includes any works taking place within 50m of the watercourse. **European Protected Species (EPS) licence-specific measures to prevent disturbance to otters at resting sites within 30m of proposed works [Couch TN5 and Holt TN10]:** • An ECoW would provide supervision during the works and would set up a 10m exclusion zone around the resting site in advance of works commencing; • A tool-box talk would be provided to all site construction workers to raise awareness of potential disturbance effects to otters; • Construction works on the access track and water crossings would be limited to daytime hours (avoiding early morning and early evening; and • Surveys would be undertaken prior to, during and following works to assess the status of the resting site.			

Environmental Measure and Rationale	Responsibility for Implementation	Compliance Mechanism	EIA Report Section Reference
The wind farm operator would ensure a site-specific risk assessment is completed and that control measures are implemented to ensure all environmental risks are minimised. Storage, use and disposal of oils would be in accordance with Best Practice and SEPA guidance.	Developer / Operator	Planning Condition	Section 9.8
Cabling along access tracks would be over 50m from the watercourse network and buried. In a limited number of instances where cables cross watercourses these would be installed on the bridge.	Developer / Contractor	Planning Condition	Section 9.8
All operational and maintenance work requirements would be undertaken within working areas clearly defined in advance of works, and the storage of materials would be restricted to areas of hardstanding e.g. permanent tracks, crane pads or substation and control building, and associated infrastructure. Any access required to areas outside of defined working areas, i.e. foot access for tag lines on adjacent peat land, would be agreed in advance with the EcOW.	Developer / Contractor	Planning Condition	Section 9.8
During the decommissioning of the Proposed Development, potential effects on ecological features are expected to be similar to those encountered during the construction phase and therefore similar environmental measures would be required. Any new legislation or guidelines published prior to decommissioning would be adhered to and incorporated into an EMP prior to decommissioning taking place.	Developer / Contractor	Planning Condition	Section 9.8
Telecommunications and Aviation			
Wherever possible, turbines are located in areas where there would be no effects on existing infrastructure, telecommunications and aviation interests. Where this is not possible, discussions with relevant operators are on-going and an agreement would be reached for alternative arrangements to be made so that existing services would not be affected by the Proposed Development.	Developer	Planning Condition	Section 10.7
A micro-siting provision has been requested such that any turbine can be moved up to 50m taking into account known environmental and telecommunications constraints. It is intended that this provision would be used to respond to any additional unforeseen infrastructure constraint.	Developer / Contractor	Planning Condition	Section 10.7
To mitigate any problems with television reception arising when the Proposed Development becomes operational, the Applicant would accept a 'Requirement' to assess current television signals in advance of the construction of the Proposed Development and would mitigate post-development problems with television reception arising where effects are attributable to it.	Developer	Planning Condition	Section 10.7
To minimise interference with the 132kV and 33kV Scottish Power electricity transmission line, power lines would be undergrounded and protected where required, following liaison with SHEPD.	Developer / Contractor	Planning Condition CMS	Section 10.8

<table>
<tr><th>Environmental Measure and Rationale</th><th>Responsibility for Implementation</th><th>Compliance Mechanism</th><th>EIA Report Section Reference</th></tr>
<tr><td>To minimise effects on the Beinn Greidaig 33kv underground cable, power lines would be located, and additional protection put in place if required during track construction.</td><td>Developer / Contractor</td><td>Planning Condition
CMS</td><td>Section 10.8</td></tr>
<tr><td>To minimise effects on NATS microwave link, it may require to be re-routed using a new transmitter.</td><td>Developer</td><td>Planning Condition</td><td>Section 10.8</td></tr>
<tr><td>To minimise effects on the Highlands and Islands Enterprise microwave link, mircositing of Turbine 20 may require to be restricted to 20m in the direction of the link.</td><td>Developer / Contractor</td><td>Planning Condition</td><td>Section 10.8</td></tr>
<tr><td>To minimise effects on the Pentland Road Wind Farm Scanning Telemetry Link, a non-radio mitigation solution may be required for the existing / new communications link to the wind farm(s)</td><td>Developer</td><td>Planning Condition</td><td>Section 10.8</td></tr>
<tr><td>The mircositing of certain turbines (T1, 2, 3, 4, 7, 8, 9, 10, 11, 28 and 34) will be restricted to avoid interference with existing telecommunications and infrastructure.</td><td>Developer / Contractor</td><td>Planning Condition</td><td>Section 10.8</td></tr>
<tr><td>In the interest of aviation safety, the proposed turbines are required to be fitted with aviation lighting as follows:
• Aviation warning lights fitted to each of the 35 turbines would comprise of four lights as follows:
  ▸ One medium intensity lighting unity (2000 candela) at hub height (105m and 88m AGL)); and
  ▸ Three low intensity units (32 candela) at half hub height (52.2m and 44m AGL).
• It is assumed that lighting would be operated by an automatic control device which reliably allows the lighting to be activated when the ambient threshold falls below 500 LUX in accordance with the requirements of the CAA policy statement and Article 222 of the UK Air Navigation Order (2016).
This lighting specification has been used to model the effects of the aviation warning lights for a Night-time Assessment, which is included as Appendix 6D. No mitigating alternative is currently available for aviation warning lights complaint with Article 222 of the UK ANO (2016), for turbines more than 150m in height to blade tip.</td><td>Developer / Contractor</td><td>Planning Condition</td><td>Section 10.7</td></tr>
<tr><td>In terms of the Met Office radar on the Isle of Lewis, the previously agreed mitigation solution for the Consented Development will be implemented, which requires the relocation of the existing Met Office radar site.</td><td>Developer</td><td>Planning Condition</td><td>Section 10.7</td></tr>
<tr><td colspan="4">Geology, Hydrology and Hydrogeology</td></tr>
<tr><td>All infrastructure associated with the Proposed Development, other than at certain proposed access track crossings, is located outside of the 1 in 200 year flood zones.</td><td>Developer</td><td>Planning Condition</td><td>Section 11.8</td></tr>
</table>

Environmental Measure and Rationale	Responsibility for Implementation	Compliance Mechanism	EIA Report Section Reference
A construction area stand-off of at least 50m has been applied to all watercourses (except for watercourse crossing.	Developer / Contractor	Planning Condition	Section 11.8
Parts of the Development Site where steep slopes at or greater than 7° were mapped (**Figure 11.4**) and identified as a significant constraint due to potential peat slide risks and enhanced runoff. These areas, along with other areas identified as having potential historic peat slides, have been avoided for construction of turbines, as well as for other infrastructure and access tracks.	Developer / Contractor	Contract requirement	Section 11.8
Incursions into SEPA 100m (shallow excavation, <1m deep) and 250m (deep excavation, >1m deep) buffer areas around the high and moderate GWDTEs have been minimised as far as possible.	Developer / Contractor	Planning Condition	Section 11.8
Prior to the commencement of construction activities, a CEMP would therefore be produced that would follow Best Practice guidance, as well as incorporating specific recommendations made in this EIA Report, and would therefore account for potential risks and minimise potential effects on the site hydrology and hydrogeology during construction. No works would be undertaken unless agreed in the CEMP. The CEMP would include or be accompanied by a Water Management Plan (WMP), a Pollution Prevention Plan (PPP) and a Pollution Incident Response Plan (PIRP) for construction activities at the site. The WMP would set out the specific details of surface water drainage, management of dewatered groundwater from excavations and watercourse crossings. The PPP would set out specific measures to protect water environment receptors from pollution arising from construction activities and a programme for inspection and monitoring to ensure the effectiveness of these measures. The PIRP would describe the response plan for pollution incidents, should accidental spillages occur despite the control measures in place.	Developer / Contractor	Planning Condition	Section 11.8
On areas of peat depths greater than 1m (i.e. covering the majority of the Development Site), floating roads are proposed (using either option A or option B). Floating roads would be constructed in line with the good practice guidance and would include the use of geogrids and geotextiles. The geotextile would be selected to maintain load distribution, ensure separation of aggregate and peat, and prevent peat rutting, erosion and drainage. Aggregate choice would be sensitive to peat geochemistry and would be of sufficient grade to allow infiltration through to the geotextile.	Developer / Contractor	Planning Condition	Section 4.5 Section 11.8
The track layout has been designed to minimise the total track length, and to avoid, where possible, intersecting catchment areas in a manner that could significantly interrupt flow paths. Cross-drainage would be provided in areas where access tracks unavoidably intersect dominant flow pathways.	Developer / Contractor	Planning Condition	Section 11.8

Environmental Measure and Rationale	Responsibility for Implementation	Compliance Mechanism	EIA Report Section Reference
The use of cut tracks may be required on areas of steeper gradient or where there are concerns about slope stability. Cut tracks would need to cut all the way through the peat, thereby potentially increasing disturbance of the local hydrology. The extent of these access tracks would be minimised.	Developer / Contractor	Planning Condition	Section 11.8
The need for drainage on the access track network would be considered for all parts of the track network: • In flat areas, drainage of floating roads is not required as it can be assumed that rainfall on to the access track would infiltrate to the ground beneath the access track or along the verges. Track-side drainage would be avoided where possible, to prevent any local reductions in the water table or influences on the access track structure and compression (the latter can occur where a lower water table reduces the ability of the peat to bear weight, increasing compression); • Where access tracks are to be placed on slopes, lateral drainage would be required on the upslope side of the access track. The length of drains would be minimised, to prevent either pooling on the upslope side or, at the other extreme, creating long flow paths along which rapid run-off could occur. Regular cross-drains would be required to allow flow to pass across the access track (as recommended in SEPA's guidance on Good Practice During Windfarm Construction), with a preference for subsequent re-infiltration on the downslope side, rather than direct discharge to the drainage network; • Check dams may be implemented in drainage ditches where necessary to reduce flow velocities to aid in the sedimentation of silt from suspension and to also direct water into the cross drains so that natural flow paths are maintained as far as possible. The ditch design would be considered in line with the recommendations of the FCS and SNH (2010) guidance, including the use of flat-bottomed ditches to reduce the depth of disturbance. • Cross-drainage may be by culverts or pipes beneath the access track, again in line with the FCS and SNH (2010) guidance. Drainage would be installed before or during access track construction, rather than afterwards, to ensure that the access track design is not compromised. The cross drainage would flow out into shallow drainage, which would allow diffuse re-infiltration to the peat on the downslope side. The cross drains would flow out at ground level and not be hanging culverts. The avoidance of steep gradients for the access tracks would also reduce the risk of erosion occurring at cross-drain outflows; • In instances of drainage close to surface watercourses, discharge from the drainage may be to surface water rather than re-infiltration. In these situations, best practice control measures including sediment settlement would be undertaken before the water is discharged into surface water systems.	Developer / Contractor	Planning Condition	Section 11.8

Environmental Measure and Rationale	Responsibility for Implementation	Compliance Mechanism	EIA Report Section Reference
The discharges would be small and collected from only a limited area, rather than draining a large area to the same location. Sufficient attenuation storage would also be incorporated into site drainage systems to ensure that discharge rates to watercourses do not adversely affect the hydrology at the site; • Areas of hardstanding would be minimised through careful design of construction compounds and minimising the size of crane pads at each turbine location to reduce the need for drainage; • The details of proposed site drainage measures would be set out in the WMP for the Development Site, which would accompany the CEMP. As the area of the Development Site considerably exceeds 4 ha, discharges from construction phase site surface water drainage systems would be subject a CAR Complex Licence from SEPA. The WMP would be subject to approval by SEPA through the CAR licence application process.			
Cables would be run alongside access tracks wherever possible, except where attached to the bridge to connect the southern and northern parts of the Proposed Development. Cable trenches alongside access tracks would be installed at the minimal depth practical, although this may reach 0.5-1m deep. Trenches would be dug and left open for the minimum time possible to ensure that they do not create open drainage routes. The trench would be backfilled as far as possible with excavated peat, to minimise the change to flow paths. Where other material is used to backfill the trenches, clay cut-off barriers would be installed across the trenches to prevent them creating preferential flow paths. Cable laying methods that do not require a dug trench would be considered.	Developer / Contractor	Planning Condition	Section 11.8
The number of watercourse crossings has been minimised as far as possible. Adherence to the SEPA Good Practice Guide for the Construction of River Crossings and WAT-SG-21 and CIRIA Culvert Design and Operation Guide (C689) would help minimise potential hydrological (including morphological) effects. All watercourse crossings would be designed to convey a 1 in 200 year return period flood event,	Developer / Contractor	Planning Condition	Section 11.8
Where possible, excavations required to facilitate the construction of foundations for turbines, service trenches and each crane base would be designed so that they can freely drain by gravity (see Section 4.5). Cut-off drains would be installed around the excavation areas to prevent surface run-off entering the excavations.	Developer / Contractor	Planning Condition	Section 11.8

Environmental Measure and Rationale	Responsibility for Implementation	Compliance Mechanism	EIA Report Section Reference
Measures based on Best Practice guidelines from SEPA would be adopted during construction to prevent pollution, with all contractors advised of a pre-planned pollution incident response procedure, as detailed in PPG21.	Developer / Contractor	Planning Condition CMS PPP PIRP	Section 4.7 Section 11.8
Turbine construction would need to adopt mitigation measures to prevent contaminants entering the shallow groundwater system. To minimise the potential of concrete leaching and alkaline pollution of groundwater, suitable sulphate-resistant concrete would be used. The foundation design would be checked with SEPA. Should ground conditions occur during excavation where gravity drainage is not possible (i.e. where low permeability rock or superficial deposits are present) the excavations would be dammed and drained by pumping. These dewatering activities would be undertaken in accordance with Best Practice (including WAT-SG-29 on Temporary Construction Methods), which would be detailed in the CEMP to be agreed by SEPA and the ECoW. The design for the dewatering would ensure collection and settling of suspended sediment (i.e. use of silt traps, fences, straw bales or lagoons). Any water removed from the excavation would be treated and pumped to a bunded and vegetated settlement and infiltration swale, downgradient of the excavation and away from watercourses, and there would be no discharge of water directly into a watercourse. The potential for infiltration would need to be carefully assessed during the detailed design should consent be granted for the Proposed Development due to the prevalence of saturated conditions across the Development Site. These activities would be design and implemented in consultation with SEPA on a foundation-specific basis following completion of detailed ground investigations and micro-siting prior to construction. The locations of swales or settlement lagoons, where required, would be on stable areas of shallow slope, to reduce the risk of failure. The size of the settlement lagoons would be appropriate to the amount of dewatering, but if large quantities of dewatering are anticipated, the potential for more than one lagoon or the use of portable silt trap devices would be considered on a foundation-by-foundation basis. If any discharge to surface watercourses is required, the water would be treated beforehand and the need for any consent from SEPA obtained (it is expected that in most cases the activities would be covered by GBR3 and/or GBR15).	Developer / Contractor	Planning Condition	Section 11.8

Environmental Measure and Rationale	Responsibility for Implementation	Compliance Mechanism	EIA Report Section Reference
A total of up to five borrow pits have been proposed to provide a supply of crushed aggregate and rock during the construction phase. The excavation of these borrow pits would require dewatering during their operation to enable the rock to be removed, although based on the status of the aquifer (low permeability) it is anticipated that the volumes of water and impacts to groundwater resources would be limited. Similar controls to those detailed above would be employed to prevent contamination of surface waters with suspended sediment.	Developer / Contractor	Planning Condition	Section 11.8
Good practice measures would be implemented to ensure that peat is appropriately stored. The peat storage areas would be located at a distance from any watercourses (outwith the 50m watercourse buffers) and would be contained to prevent sediment or nutrient run-off from eventually reaching downstream watercourses. The storage of peat during construction would minimise slumping and maintain stratification, where possible using water derived from dewatering activities to keep the peat adequately saturated to prevent desiccation and degradation. It is anticipated that all excavated peat can be re-used on site (see **Appendix 9H**). The upper levels of the peat and turf excavated for the turbine bases can be used for resurfacing following construction (in non-hardstanding areas), thus maintaining the hydrological and biological characteristics of the location. This resurfacing would aim to restore a flat surface around the turbine, preventing mounding. This would help to re-establish hydraulic continuity of the replaced peat and turf with surrounding saturation levels, thereby reducing the possibility of peat drainage and desiccation.	Developer / Contractor	Planning Condition	Section 11.8
Site activities during construction and operation have been identified to have potential effects on the water environment. These can be controlled by the implementation of pollution prevention and control measures and Best Practice including: • A PPP and PIRP would be prepared for the Proposed Development, the latter in line with GPP 21, and all contractors would be briefed on these plans; • Equipment to contain and absorb spills would be readily available; • Fuel would be stored in either a bunded area or self-bunded above-ground storage tank (AST) on site during the course of the construction phase in accordance with the Water Environment (Oil Storage) (Scotland) Regulations 2006 and other SEPA Pollution Prevention Guidelines, and GBR9. The bunded area would have a capacity of 100% of the fuel tank. All stores would be located at least 20m from any watercourses; • In areas where there is a potential for hydrocarbon residues from run-off / isolated leakages, surface water drainage would be directed to a hydrocarbon interceptor prior to discharge;	Developer / Contractor	Planning Condition CMS PMP PIRP	Section 11.8

Environmental Measure and Rationale	Responsibility for Implementation	Compliance Mechanism	EIA Report Section Reference
• Plant and machinery used during the construction phase would be maintained to minimise the risks or oil leaks or similar. Maintenance and refuelling of machinery would be undertaken off-site or within designated areas of temporary hardstanding. In these designated areas, contingency plans would be implemented to ensure that the risk of spillages is minimised. Placing a drip tray beneath plant and machinery during refuelling and maintenance would contain small spillages; • To prevent ingress of salt into the Development Site from the Marybank salt store at the site entrance, bunding would be installed and maintained downgradient of the salt store, with periodic removal of the retained waters; • During operation, the potential risk to the environment from performing maintenance activities would be identified by the operator prior to serving being undertaken. The operator would be required to ensure a site-specific risk assessment is completed and that control measures are implemented to ensure all environmental risks are minimised. However, as a pre-requisite the storage, use and disposal of oils would be done in accordance with good practice and SEPA guidance (GPP 8).			
During operation, ongoing maintenance would be carried out, for example, to maintain drainage and settlement ponds.	Developer	Planning Condition	Section 1.8
Noise			
To minimise disturbance, the construction process would have regard to general guidance for controlling construction noise that is given in British Standard BS5228-1:2009+A1: 2014 *'Noise and Vibration on Construction and Open Sites. Part 1: Noise'*.	Developer / Contractor	Planning Condition	Section 12.8
Blasting from the borrow pits would be managed with a Blasting Management Plan. Part of this plan would be to minimise noise, air overpressure and groundborne vibration.	Developer / Contractor	Planning Condition	Section 12.8
The aim of the wind farm noise assessment is to achieve a design from which noise emissions meet limits derived following the approach given in ETSU-R-97 and/or relevant local guidelines. Consequently, the design of the scheme is such that necessary operational noise limits are met and no further environmental mitigation measures are required. The operator would be required to ensure that sound power level limits are not exceeded during operation.	Developer	Planning Condition	Section 12.8
Traffic and Transport			

Environmental Measure and Rationale	Responsibility for Implementation	Compliance Mechanism	EIA Report Section Reference
A Construction Traffic Management Plan (CTMP) would be developed to manage the traffic impact as part of the Development Site. The CTMP would manage daily delivery profiles and control movements and routing of HGVs through the following measures: • Traffic routing strategy – ensuring vehicles access the Development Site via the most appropriate route and avoid unnecessary conflict with sensitive areas; • Traffic timing strategy – programme vehicles arrivals / departures and working hours to lessen the impact on the highway network; • Temporary signage – in accordance with Department for Transport (Dft) *Traffic Signs Manual, Chapter 8* to inform local road users of construction access points and the presence of HGVs; • Traffic manuals – to marshal access point and Core Path crossings whilst deliveries are taking place; • Temporary traffic management – provided on approaches to accesses in the form of traffic warning signs, possible reductions in speed limit signs to ensure safe passage of vehicles. All signage in accordance with DfTs *Traffic Signs Manual, Chapter 8*; • Site access designed in accordance with Design Manual for Roads and Bridges (DMRB); and • Staff Travel Plan – would provide details of how staff should travel to the Development Site in an effort to reduce single occupancy vehicle journeys.	Developer / Contractor	Planning Condition	Section 13.9