



# Carron Valley Wind Farm

## EIA Scoping Report

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## 1.0 Introduction

### 1.1 Overview

Eurowind Energy Limited intends to apply to Stirling Council for planning permission to develop a wind farm on Forestry and Land Scotland (FLS) land at Cairnoch Hill, immediately (within 30m) north of the Carron Valley Reservoir, and approximately 6km east of the settlement of Fintry, Stirlingshire. The Site is located entirely within the administrative boundary of Stirling Council and is centred on National Grid Reference NS 69768 85606 (**Figure 1**).

It is anticipated that the proposed wind farm would comprise up to four wind turbines with associated infrastructure, including internal transformers, crane hardstandings, upgraded and new access tracks, cabling, borrow pits and a single substation with control building ('the proposed development'). It is proposed that the turbine blade tip height would be up to 200m.

It is the intention to submit an application for planning permission under the Town and Country Planning (Scotland) Act 1997 (as amended). It is anticipated that the proposed development would have a generation capacity exceeding 20MW but less than 50MW and therefore would be classed as a Major development<sup>1</sup> under the Town and Country Planning (Hierarchy of Development) (Scotland) Regulations 2009.

SLR Consulting Limited (SLR) has been appointed to undertake an Environmental Impact Assessment (EIA) Scoping study and prepare this Scoping Report to accompany a request to Stirling Council to adopt a Scoping Opinion under Regulation 17 of the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 (the EIA Regulations).

The findings of the EIA process will be used to inform the final design of the proposed development and assess its predicted environmental effects. The results of the EIA will be presented in an EIA Report that will be submitted with the planning application made to Stirling Council.

### 1.2 Purpose of the Scoping Report

Undertaking an EIA Scoping Study is regarded as good practice<sup>2</sup> and is an important step in EIA as it allows all parties involved in the process to agree on key environmental issues relevant to the proposed development and to agree on the methodology used for their assessment. The scoping stage seeks to engage the planning authority and other statutory and non statutory stakeholders at an early stage in the planning process; ensuring that key issues, based on local understanding, are identified.

The specific aims of this Scoping Report are to:

- identify the technical subject areas that may be subject to significant environmental effects as a result of the proposed development proceeding, and therefore require further study;
- identify the technical subject areas that are unlikely to be subject to significant environmental effects and can be scoped out from further study;

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<sup>1</sup> Regulation 2(1) – 4 Electricity Generation of the Schedule Major Developments, Town and Country Planning (Hierarchy of Developments) (Scotland) Regulations 2009

<sup>2</sup> Scottish Natural Heritage (SNH) and Historic Environment Scotland (HES) (2018) Environmental Impact Assessment Handbook Version 5



- provide a basis for a consultation process to agree the scope and content of the EIA with the Local Planning Authority;
- provide a basis for agreeing methodologies for undertaking required studies with the Local Planning Authority, based upon currently available baseline data, site characteristics and best practice in individual technical disciplines; and
- provide all statutory consultees and stakeholders with an opportunity to comment on the proposed development at an early stage.

In making its formal Scoping Opinion, under Regulation 17(4)(a) of the EIA Regulations, the Local Planning Authority must consult with a number of consultees and incorporate their views within the Scoping Opinion.

Upon receipt of the Scoping Opinion, the EIA process will continue and will lead to the preparation of an EIA Report which will accompany a planning application, paying due cognisance to the findings and responses received during the Scoping Study.

### **1.3 Notice of Intention**

The applicant, Eurowind Energy Limited, hereby gives Stirling Council notice in writing that it intends to make a planning application (as detailed above), and to accompany such an application with an EIA Report.

This notice, made pursuant to Regulation 17 of the EIA Regulations, includes information necessary to identify the location, the nature and purpose of the proposed development, and indicates the main environmental consequences to which the prospective applicant proposes to refer to in its EIA.

### **1.4 The Applicant**

Eurowind Energy Limited (EWE) is one of Europe's leading renewable energy companies. With a head office in Hobro, Denmark, EWE employs approximately 600 staff across 16 countries. EWE is 50% owned by Holdings Aps and 50% by Norlys. Norlys is Denmark's largest integrated energy and telecom group with more than 700,000 shareholders and 2,500 employees.

EWE develop, construct, and operate wind, solar photovoltaic and 'Power to X' assets across Europe and in the USA. As of November 2022, EWE owned 857MW of operational renewable assets and held under asset management a portfolio of 1,616MW. The Company has a growing development pipeline of 25,500MW which is anticipated to deliver over 300MW per year into ownership and 550MW into asset management over the next few years. Currently the business is adding one new Country per year to its development business and is on target to meet a 2025 target of 2,000 operational MW in ownership and 4,000MW in asset management.

EWE employs an experienced UK team based in Glasgow that was established in 2021. EWE UK has one operational wind farm and one consented 16MW solar farm at Howpark, in the Scottish Borders and a growing development portfolio of over 1GW (including the Uisenis Wind Farm (Isle of Lewis) application to the Energy Consents Unit in 2023).

### **1.5 SLR Consulting Limited**

SLR is a Registered Environmental Impact Assessor and Member of the Institute of Environmental Management and Assessment (IEMA) and holder of the EIA Quality Mark (<http://www.iema.net/qmark>). SLR is also a member of the Association of Geotechnical and Geoenvironmental Specialists, and a Landscape Institute (LI) Registered Practice.



The company has significant experience and expertise in the preparation of planning applications and undertaking EIA for a wide variety of projects. SLR's environmental specialists, have the skills and relevant competency, expertise and qualifications to undertake EIA for the proposed development.

Further information on SLR can be found on its corporate website at [www.slrconsulting.com](http://www.slrconsulting.com)

## 1.6 Project Team

SLR has been commissioned by the applicant to undertake the EIA for the proposed development, with input from the following specialist consultants:

- Optimised Environments (OPEN, part of SLR) in relation to Landscape and Visual;
- APEM in relation to Ornithology;
- TNEI in relation to Noise and Vibration;
- DGA Forestry in relation to Forestry;
- BIGGAR Economics in relation to Socio-economic, Recreation, Tourism and Land Use;
- Wind Farm Aviation Safeguarding in relation to Aviation; and
- David Bell of DBPlanning providing Planning support.

## 1.7 Report Structure

Following this introductory section, the remainder of this Scoping Report comprises the following sections:

- Section 2.0: Site and Surroundings
  - describes the location, setting and physical characteristics of the Site and describes baseline features in and around the Site;
- Section 3.0: Proposed Development
  - provides an outline of the proposed development;
- Section 4.0: Scoping the EIA
  - provides detail on the approach to scoping the EIA, sets out the process of Scoping consultation and describes the specialist studies that will be undertaken to assess the impact of the proposed development on the environment, and a reasoning why certain aspects have been scoped out of the EIA;
- Section 5.0: Planning Policy and Guidance
  - identifies the development plan and provides a list of policy and guidance to be considered;
- Section 6.0 - 14.0: Specialist environmental studies that are proposed to be undertaken
  - describes the specialist environmental studies that are proposed to be undertaken to assess the potential significant impacts of the proposed development on the environment and where relevant notes those aspects to be scoped out of assessment;
- Section 15.0: Other Environmental Issues



- describes the environmental topics which are not likely to experience significant effects and are therefore proposed to be scoped out of the EIA;
- Section 16.0: Schedule of Commitments
  - summarises what information will be contained within the Schedule of Commitments Chapter of the EIA Report;
- Section 17.0: Invitation to Comment
  - provides contact details for responding to or discussing any matters contained within this report in greater detail prior to responding to the scoping exercise.
- Section 18.0: Closure



## 2.0 Site and Surroundings

### 2.1 Site Location

The Site is located on FLS land at Cairnoch Hill within the Lennox Hills - immediately north of the Carron Valley Reservoir (within 30m). The centre of the Site is at National Grid Reference NS 69768 85606 (See **Figure 1** for Site Location). The Site is located wholly within Stirling Council administrative boundary although it is in close proximity to the North Lanarkshire Council boundary to the immediate south.

The Site is located approximately 11km south west of Stirling town centre, approximately 10km west of Denny, and approximately 5.5km north of Kilsyth.

There are no statutory environmental designations within the Site boundary.

The Site is predominantly covered with conifer plantation (or recently felled plantation).

Elevations across the Site (from the B818 in the south) range from approximately 228m AOD at the south western edge of the Site boundary. to approximately 410m AOD in the centre of the Site (Cairnoch Hill)<sup>3</sup>.

Soils and subsoils across the Site are considered shallow (<0.5m) to the centre and south, and deep (>1m) along the ridge of Cairnoch Hill, and to the wider fringes of the Site. The subsoil is comprised of glacial till to the east and west (Devensian); basalt-derived material in the centre/south and peaty podzols in the north extent. The underlying bedrock geology at the Site comprises basaltic rocks of the Campsie Lava Member, Gargunnoch Hills Lava Member, Overton Lava Member and Spout of Ballochleam Lava Member<sup>4</sup>.

Carbon and Peatland classifications across the Site are shown to be a mix, predominantly of Class 4, Class 5 and mineral soils, with smaller areas of Class 3<sup>5</sup>.

There are a number of small watercourses within the Site running between steep slopes.

The Site lies within two river catchment areas<sup>6</sup>. The north west extent of the Site lies within the River Leven catchment area whilst the remainder of the Site lies within the River Carron catchment area.

The whole Site is located within a local landscape designation; the Southern Hills Local Landscape Area (LLA) (See **Figure 9**). No part of the Site, or immediately surrounding area, is covered by any nationally important landscape designation.

The Landscape Character of the Site is '*Lowland Hills – Central*' Landscape Character Type No: 149<sup>7</sup>. Characteristics of this LCT include prominent, open, large-scale character with smooth upper slopes and hill summits with occasional conifer blocks and dispersed dwellings.

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<sup>3</sup> BGS, GeoIndex Onshore – OS Terrain 50 DTM

<sup>4</sup> BGS, GeoIndex Onshore – Superficial Deposits 1:50,000; Bedrock Geology 1:50,000

<sup>5</sup> Scottish Government, Scotland's Environment Map – Carbon and Peatland 2016

<sup>6</sup> Scottish Government, Scotland's Environment Map – Main River and Coastal Catchments

<sup>7</sup> NatureScot, Landscape Character Types Map and Descriptions



## 2.2 Surrounding Area

Fintry is the closest village to the Site, approximately 6km to the west. Further scattered rural properties are concentrated in the locale of the Carron Fishery and Earlsburn - approximately 1.4km and 2.2km east (respectively), along the B818.

The B818 runs on an east west axis between the southern boundary of the Site and the northern shoreline of the Carron Valley reservoir. The road links Denny in the east with the A875 to the west, providing connection to the settlements of Balfron and Killearn

An unclassified road spurs off the B818 and runs broadly south west to north east in the direction of Stirling. This road runs immediately adjacent to part of the western Site boundary.

The Endrick Water flows approximately 500m west of the Site boundary. The Earl's Burn flows along the Site's north eastern boundary. Both watercourses are afforded 'Good' status by SEPA.<sup>8</sup>

The Kilsyth Hills Special Landscape Area (SLA) is located approximately 550m to the south of the Site, on the southern side of the Carron Valley Reservoir.

Core paths in the vicinity of the Site (namely 9078Bb/71, NL/1/1, NL/2/1, NL/3/1<sup>9</sup>) lie to the north, east and south of Carron Valley reservoir and provide a Public Right of Way (PROW) network in and around the Kilsyth Hills.

There is a Scheduled Monument (SM4278) immediately west of the Site boundary. This Scheduled Monument is the remains of Sir John de Graham's Castle.

**Figure 14** shows ecology designations in and around the Site, to 20km and beyond.

Statutory ecological designated sites within 10km of the Site are:

- Endrick Water Special Area of Conservation (SAC) and Site of Special Scientific Interest (SSSI) (c.2.5 km west of nearest turbine) designated for Atlantic Salmon and Brook and River Lamprey species;<sup>10</sup>
- Double Craigs SSSI (c.4.8km west of nearest turbine) is designated for geological significance;
- Denny Muir SSSI (c.5.83km east of nearest turbine) - designated for basic fen, blanket bog and subalpine acid grassland;
- Carron Glen SSSI (c.5.87km east of nearest turbine) - designated for lowland neutral grassland, upland oak woodland and upland ash woodland;
- Corrie Burn SSSI (c.6.5km south of nearest turbine) is designated for geological significance;
- Sauchie Craig Wood SSSI (c.7km north east of nearest turbine) is designated for upland ash woodland;
- Dullatur Marsh SSSI (c.9.54km south east of nearest turbine) - designated for hydromorphological mire range;
- Balglass Corries SSSI (c.9.31km west of nearest turbine) is designated for upland assemblage habitat, blanket bog and geological significance;

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<sup>8</sup> Scottish Government, Scotland's Environment Map – River Classifications

<sup>9</sup> Scottish Government, Scotland's Environment Map – Core Paths

<sup>10</sup> Scottish Government Scotland's Environment Map – Sites of Special Scientific Interest, Special Areas of Conservation



- Sculliongour Limestone Quarry SSSI (c.9.43km east of nearest turbine) - designated for lowland calcareous grassland;
- Balgrass Quarries SSSI (c.10.31km east of nearest turbine) - designated for upland assemblage habitat, blanket bog and geological significance;
- Sauchie Craig Wood SSSI (c.7.46km north of nearest turbine) - designated for upland ash woodland; and
- Wester Balgair Meadow SSSI (c.10.92km west of nearest turbine) - designated for lowland dry heath, lowland wet heath, lowland neutral grassland and valley fen;

Other relevant non-statutory ecological designations include The Carron Valley Local Nature Conservation Site (LNCS), which covers the entire reservoir extent.

The closest residential properties to the Site boundary are:

- two recently constructed properties on the north side of the B818 (NS 69267, 84492) which are immediately adjacent to the Site boundary - these properties are financially involved with the proposed development;
- Todholes Farm at approximately 1km west of the Site boundary; and
- New Cairnoch Lodge and Easter Cringate at approximately 260m to the north of the Site boundary.

## 2.3 Cumulative Context

**Table 2-1** details the ‘operational’, ‘consented’, ‘in planning’ and ‘Scoping stage’ wind farms within 10km of the Site.

**Table 2-1 : Cumulative Wind Farm Development**

Wind Farm	Status	Distance (m/km)	Specification
Craigannet Turbine	Operational	190m east	1 turbine, 102m to blade tip
Craigengelt Wind Farm	Operational	480m north east	8 turbines, 125m to blade tip
Earlsburn Wind Farm	Operational	520m north	15 turbines, 110m to blade tip
Craigton and Spittal Hill Wind Farm	Consented	1.6m north west	7 turbines, 125m to blade tip
Shelloch Wind Farm	Consented	1.6km north west	5 turbines, between 149.9m to 180m to blade tip
Earlsburn North (Kingsburn) Wind Farm	Operational	2.5km north	9 turbines, 115m to blade tip
Earlsburn Extension Wind Farm	In Planning (Appeal/Application)	2.7km north	13 turbines, 180m to blade tip
Drummarnock Wind Farm	Scoping	1km north east	4 turbines, 180m to blade tip

Cumulative wind farm sites, out to 45km, in relation to the proposed development are shown on **Figure 13**.





## 3.0 Proposed Development

### 3.1 Design Development

Some design work has already been undertaken for the proposed development. A summary of how the current Scoping layout was achieved through the constraints mapping and design process is provided in Sections 3.1.1 to 3.1.3 below.

#### 3.1.1 Technical and Hard Constraints

The key technical constraints of topography, watercourses, peat, noise, and heritage assets, were mapped in order to identify the areas within the Site where turbines could likely be accommodated. **Figure 2** shows the areas of the Site which are constrained by slope steepness and watercourses. **Figure 3** shows peat depth, Scheduled Monuments and residential receptors within 1km of the Site.

#### 3.1.2 Other Constraints

Further to the technical / hard constraints detailed above, other constraints have also been considered in order to achieve the current Scoping layout. These constraints include:

- Cultural heritage and archaeology;
- Landscape and visual;
- Ecology;
- Ornithology; and
- Traffic and transport.

Following on from this and from consideration of the technical / hard constraints detailed in Section 3.1.1, different turbine layouts were considered from key design viewpoints. This process has enabled optimisation of the number, size and locations of the proposed turbines in relation to the landform of the Carron Valley and nearby operational wind farms.

#### 3.1.3 Consultation

A four turbine 200m to tip wind farm layout was presented to Stirling Council in May 2024 as part of the pre-application advice request. A pre-application advice email was received from Stirling Council on 19 July 2024.

A summary of the key design related issues raised by Stirling Council, as part of the pre-application advice, for consideration in the design and scope of the EIA are summarised as follows:

- The surrounding hills give the Carron Valley a sense of intimacy and enclosure reminiscent in some ways of highland lochs and glen, and although the windfarm proposed is small in number, the relationship with other wind farm developments; the height of the turbines, design and positioning will be significant factors in terms of their impacts on landscape character of the area;
- Consideration should be given to the Stirling Landscape Sensitivity and Capacity Study for Wind Energy Developments, updated in January 2015. This states that the landscape character types covering the Site have 'no', or 'low' capacity for wind energy development; and
- The layout should minimise the impact on the landscape character as far as reasonably possible and also take account of aviation and defence interests which have been a concern on past applications for similar development in this area.



### 3.1.4 Scoping Layout

Taking into account the constraints outlined in Sections 3.1.1 and 3.1.2, as well as the pre-application advice received (Section 3.1.3) from Stirling Council, the current proposed layout comprises four turbines of up to 200m to tip height (see **Figure 4**).

The design objectives for the Site will be refined and used to evaluate further layout iterations which will continue to take account of a range of environmental and technical considerations where feasible, to create a final optimised layout for the planning application's submission.

It is not expected that a new layout will alter the scope of, or approach to the EIA and therefore the scoping process is taking place in parallel to the design review (we would welcome the design input of Stirling Council via EIA Scoping response and post Scoping design meetings). The design optimisation and iteration process from initial feasibility through to the final design will be reported and illustrated in the EIA Report and Design and Access Statement (DAS).

## 3.2 Proposed Development

It is currently anticipated that the proposed development would consist of up to four wind turbines with a tip height of up to 200m (**Figure 5**). The associated infrastructure would include the following components:

- A network of onsite access tracks and drainage;
- Crane hardstandings adjacent to each turbine;
- Foundations supporting each turbine;
- Power cables linking the turbines laid in trenches underground;
- One permanent and one temporary anemometry mast;
- Two borrow pit search area;
- A substation compound including a control building; and
- Two temporary site construction compounds.

Based upon the proposed maximum turbine tip height, it is anticipated that the installed nominal capacity of each turbine will be approximately 6.5MW, giving a total generation capacity of up to 26MW. The annual output of the wind farm would be approximately 91,000 MWh/y (based on a site specific capacity factor of 40%), enough to meet the needs of approximately 28,000 UK homes<sup>11</sup>. The proposed development would result in emissions savings of approximately 38,000 tonnes of CO<sub>2</sub> per annum<sup>12</sup>, compared to a fossil fuel mix of electricity.

### 3.2.1 Wind Turbines

An indicative layout of four turbines (at 200m to tip height) is shown on **Figure 5** with proposed coordinates provided in **Appendix 01**. Each wind turbine would be served by its own electrical transformer. A candidate turbine manufacturer and 'worst case' model will be selected for each technical and environmental discipline for the purposes of the EIA. A competitive procurement process would be undertaken, should consent be forthcoming and

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<sup>11</sup> Based on the latest RenewableUK methodology, utilising the most recent statistics from the Department of Business, Energy and Industrial Strategy (BEIS) (<https://www.renewableuk.com/page/UKWEDEexplained>)

<sup>12</sup> Based on the latest RenewableUK methodology, utilising the most recent statistics from the Department of Business, Energy and Industrial Strategy (BEIS) (<https://www.renewableuk.com/page/UKWEDEexplained>)



prior to construction, to select the final turbine that would be installed onsite. The specification of the wind turbine would be a typical horizontal axis design, comprising three rotor blades, a hub and a nacelle. The tower would be tubular and tapered in design and finished in a light grey semi-matt colour.

### **3.2.2 Grid Connection**

The precise route of cabling from the onsite substation to the connection point has not yet been determined and would be subject to a separate application and therefore is outwith the remit of this Scoping Report.

### **3.2.3 Site Access**

A high level assessment of potential routes for abnormal loads has been undertaken for 85m blades. It is anticipated that the abnormal load route will begin from the port of Grangemouth via:

- Central Dock Road;
- A904 Earls Road;
- M9 to Junction 9;
- A872 south towards Dunipace;
- A872 Nethermains Road; and
- B818 to site access.

An Abnormal Load Route Assessment (ALRA) will be undertaken to inform the EIA Report, planning application and Construction Traffic Management Plan (CTMP).

## **3.3 Construction Works**

The overall duration of the construction works would be approximately 16 months.

## **3.4 Wind Farm Lifecycle and Decommissioning**

It is anticipated that the proposed development would have an operational life of up to 40 years. At the end of the operational life the proposed development would be decommissioned, or an application may be submitted to repower the Site. The decommissioning period would take up to a year.

The ultimate decommissioning approach would be agreed with Strirling Council and other appropriate regulatory authorities in line with best practice guidance and requirements of the time. This would be done through the preparation and agreement of a Decommission and Restoration Plan (DRP). Financial provision for the decommissioning would be provided for.

Over the period of operation of the wind farm it is recognised that there are likely to be changes in legislation and guidance, environmental designations, the status/condition of sensitive environmental receptors and stakeholder objectives that may affect decommissioning and restoration methodologies. The detailed DRP would reflect the scientific ideas and best practice current at the time of decommissioning and restoration.

With this in mind, an assessment of the decommissioning of the proposed development will not be undertaken as part of the EIA, as at this stage the future baseline conditions cannot be predicted accurately and both the proposals for refurbishment/decommissioning and the future regulatory context are unknown.

Decommissioning is, therefore, scoped out for all environmental topics and is not discussed further.



## 4.0 Scoping the EIA

### 4.1 Introduction

The EIA Directive (2014/52/EU) was transposed into the current EIA Regulations on 16 May 2017. The EIA will be undertaken in accordance with the EIA Regulations, Planning Circular 01/2017: Environmental Impact Assessment regulations (Scottish Government, 2017), the best practice guidelines of the Institute of Environmental Management and Assessment (Guidelines for Environmental Impact Assessment) published in 2016 and the SNH Environmental Impact Assessment Handbook (2018).

The principal purpose of the EIA will be to assess in a systematic manner the potential significant environmental effects of the proposed development. Throughout the process of undertaking the EIA, the results obtained will be used in an iterative manner to influence the design of the proposed development, in order that any significant, detrimental environmental effects can be designed out (embedded mitigation), minimised or negated completely through the careful design and approach to mitigation.

### 4.2 Approach to Scoping

This Scoping Study has been based upon both site survey and desk-based work.

The desk-based appraisal includes consideration of datasets from a variety of sources including Ordnance Survey (OS) mapping, the Development Plan, information on the proposed development supplied by EWE, and application documents (including environmental assessments) submitted for nearby wind farm schemes including Earlsburn, Earlsburn (Kingsburn) North, Earlsburn Extension, Craigengelt, Craigannet, Craigton and Spittal Hill; and Shelloch wind farms. The desk-based appraisal has been complemented by the use of Geographic Information System (GIS) technology to collate and identify potential environmental receptors and environmental designations that may be affected by the development. The GIS datasets comprise details of ecologically important sites, sites of archaeological and/or cultural heritage importance, landscape designations and other important receptors (houses, watercourses etc). The potential receptors and designated sites that have been identified are shown on **Figures 2, 3, 4, 9, 14 and 21**.

The findings of desk-based and GIS work have been augmented by some Site reconnaissance and survey work, as well as discussion with consultees (including pre-application advice). Site work has included a Phase 1 habitat and National Vegetation Classification (NVC) survey, protected mammal survey, bird surveys, ongoing bat activity surveys, an initial peat depth survey and a site visit to identify key landscape receptors.

### 4.3 Potential Environmental Effects

The EIA Regulations (Regulation 4 (2), (3) and (4)) specify that the EIA must:

*“(2) identify, describe and assess in an appropriate manner, in light of the circumstances relating to the proposed development, the direct and indirect significant effects of the proposed development (including, where the proposed development will have operational effects, such operational effects) on the factors specified in paragraph (3) and the interaction between those factors.*

*(3) The factors are —*

*(a) population and human health;*

*(b) biodiversity, and in particular species and habitats protected under Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (a) and*



*Directive 2009/147/EC of the European Parliament and of the Council on the conservation of wild birds;*

*(c) land, soil, water, air and climate; and*

*(d) material assets, cultural heritage and the landscape.*

*(4) The effects to be identified, described and assessed under paragraph (2) include the expected effects deriving from the vulnerability of the development to risks, so far as relevant to the development, of major accidents and disasters.”*

Previous experience of other wind farm projects, combined with the requirements of the EIA Regulations, pre-scoping consultation, the knowledge of the Site and possible effects of the proposed development, has led to the identification of the following topics for consideration in the EIA. A summary of known baseline conditions of relevance, predicted effects, any outline mitigation measures that can be recommended at this stage and the proposed scope for the EIA is provided for each of the following topic areas, in Sections 6.0 to 15.0 of this Scoping Report:

- Landscape and Visual;
- Ecology;
- Ornithology;
- Hydrology, Hydrogeology and Soils;
- Archaeology and Cultural Heritage;
- Noise and Vibration;
- Site Access, Traffic and Transport;
- Aviation;
- Socio-economics, Tourism, Recreation and Land Use; and
- Other Environmental Issues.

For each topic that is identified as requiring further study, a detailed technical assessment will be carried out in accordance with the scope and methodology agreed with relevant consultees. Each technical assessment will be carried out by an appropriately qualified consultant to prevailing technical standards and reported in a dedicated EIA Report Chapter.

The technical assessments will provide a detailed assessment of potential impacts, identification of mitigation measures and description of the significance of residual effects (those remaining after the mitigation measures have been implemented). The EIA will identify direct and indirect effects, positive (beneficial) and negative (adverse) effects, and seek to identify, as far as possible, the duration of such effects, whether short term, long term, permanent, temporary, periodic, etc. during the construction and operational phases of the proposed development. The results of each technical assessment will be reported in the EIA Report and will be accompanied by technical appendices and illustrative material where appropriate. A Non-Technical Summary (NTS) will be prepared conveying the key findings in a clear and concise format.

## **4.4 Consultation**

### **4.4.1 Pre-Scoping Consultation**

Following the submission of pre-application advice request by SLR, a pre-application advice response was received from Stirling Council in July 2024. This information has been used to



inform the Scoping Report. Detail on the pre-application advice received from Stirling Council (and other consultees) is contained in Section 3.1.3.

#### **4.4.2 Scoping Consultation**

This Scoping Report is submitted to Stirling Council, who will then consult with key consultees and stakeholders before adopting its Scoping Opinion. It is anticipated that the agencies and bodies consulted will include those listed in **Appendix 02**; this list is not exhaustive and other agencies are likely to be consulted during the EIA as and when required.

The purpose of the consultation is to identify:

- key local, regional and national issues and concerns;
- issues of environmental importance that may be affected by the proposed development and need to be considered in an EIA;
- existing information that will be of assistance in the assessment of the environmental effects; and
- the need for further consultation.

#### **4.4.3 Public Consultation**

In line with the Town and Country Planning (Pre-Application Consultation) (Scotland) Amendment Regulations 2021, a minimum of two rounds of 'in-person' public exhibitions will be held throughout 2024 (with a minimum of two weeks between each event). The first event will present an opportunity for the public to learn about the proposed development through information panels and visualisations. Feedback on the proposed development will be encouraged and where received and appropriate, taken into account in the development of the design and EIA.

The second exhibition will provide the public with an update on progress and provide further details about the evolving design of the wind farm, an update on the EIA, and further information on community and other economic benefits together with submission timescales.

It is anticipated that discussions will take place with the community councils and other community groups in the near future, prior to any public exhibition event being held.





## 5.0 Planning Policy and Guidance

The Town and Country Planning (Scotland) Act 1997 (the Act), as amended, requires that in determining applications for planning permission a Planning Authority must determine that application in accordance with the Development Plan, unless material considerations indicate otherwise. In the EIA Report, a planning policy chapter will set out the national and local policy context.

Furthermore, a Planning Statement will accompany the planning application and will consider the balance of effects of the proposed development as set out in the EIA, in the context of Development Plan policy and other material considerations.

### 5.1 The Development Plan

The proposed development lies wholly within the administrative area of Stirling Council.

Section 13 of the Planning (Scotland) Act 2019 (the 2019 Act) amends Section 24 of the Act regarding the meaning of the statutory development plan, such that for the purposes of the Act, the development plan for an area is taken to consist of the provisions of:

- The National Planning Framework; and
- Any Local Development Plan (LDP).

The statutory Development Plan therefore comprises: National Planning Framework 4 (2023) (NPF4); the Stirling Local Development Plan (2018) (LDP)<sup>13</sup>; and a suite of supplementary guidance, including 'Wind Energy Developments'<sup>14</sup> (2019) ('the Wind Energy SG'). The Stirling Landscape Sensitivity and Capacity Study for Wind Energy Development<sup>15</sup> was updated (January 2015) to inform the Wind Energy SG.

A key provision of the 2019 Act is that in the event of any incompatibility between the NPF4 and a LDP then whichever of them is the later in date will prevail. That includes matters where a LDP is silent on an issue that is provided for in NPF4.

Under the provisions of Section 25 of the Act, the Development Plan forms the primary basis upon which any future application will be determined and will be the primary material consideration in the determination of the application.

#### 5.1.1 National Planning Framework 4 (NPF4)

##### **The National Spatial Strategy: Delivery of Sustainable Places**

Part 1 of NPF4 sets out the Spatial Strategy for Scotland to 2045 based on six spatial principles which are to influence all plans and decisions. The introductory text to the Spatial Strategy starts by stating (page 3):

*“The world is facing unprecedented challenges. The global climate emergency means that we need to reduce greenhouse gas emissions and adapt to the future impacts of climate change.”*

The principles are stated as playing a key role in delivering the United Nations Sustainable Development Goals and the Scottish Government's National Performance Framework .

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<sup>13</sup> Stirling Council, Local Development Plan (2018) - <https://www.stirling.gov.uk/planning-and-building/planning-and-building-standards-documents-a-z/stirling-council-local-development-plan-2018/>

<sup>14</sup> Stirling Council, Supplementary Guidance: Wind Energy Developments (February 2019) - <https://www.stirling.gov.uk/planning-and-building/planning-and-building-standards-documents-a-z/wind-energy-developments-february-2019/>

<sup>15</sup>



The Spatial Strategy is aimed at supporting the delivery of:

- *‘Sustainable Places’*: “where we reduce emissions, restore and better connect biodiversity”;
- *‘Liveable Places’*: “where we can all live better, healthier lives”; and
- *‘Productive Places’*: “where we have a greener, fairer and more inclusive wellbeing economy”.

Page 6 of NPF4 addresses the delivery of sustainable places. The proposed development would help to deliver sustainable places. Reference is made to the consequences of Scotland's changing climate, and it states, inter alia:

*“Scotland’s Climate Change Plan, backed by legislation, has set our approach to achieving net zero emissions by 2045, and we must make significant progress towards this by 2030.....Scotland’s Energy Strategy will set a new agenda for the energy sector in anticipation of continuing innovation and investment.”*

The National Spatial Strategy in relation to ‘sustainable places’ is described (page 7) as follows:

*“Scotland’s future places will be net zero, nature-positive places that are designed to reduce emissions and adapt to the impacts of climate change, whilst protecting, recovering and restoring our environment.*

*Meeting our climate ambition will require a rapid transformation across all sectors of our economy and society. This means ensuring the right development happens in the right place.*

*Every decision on our future development must contribute to making Scotland a more sustainable place. We will encourage low and zero carbon design and energy efficiency, development that is accessible by sustainable travel, and expansion of renewable energy generation.”*

### **National Planning Policy**

Part two of NPF4 sets out the National Planning Policy against which any future proposal will be tested and used to determine a future planning application.

The relevant national planning policies under sustainable places are:

- Policy 1 (Tackling the climate and nature crises);
- Policy 2 (Climate Mitigation and Adaptation);
- Policy 3 (Biodiversity);
- Policy 4 (Natural Places);
- Policy 5 (Soils);
- Policy 6 (Forestry, Woodland and Trees);
- Policy 7 (Historic Assets and Places); and
- Policy 11 (Energy).

A summary for each of these is provided below with the exception of Policy 11 which is provided in full as it sets out support for onshore wind development. The policy provides support for the principle of the proposed development subject to all other relevant policies being satisfied.





### **Policy 1 (Tackling the climate and nature crises)**

Policy 1 states that: “*when considering all development proposals significant weight will be given to the global climate and nature crises*”.

### **Policy 2 (Climate mitigation and adaptation)**

Policy 2 seeks to encourage, promote and facilitate development that minimises emissions and adapts to the current and future impacts of climate change.

### **Policy 3 (Biodiversity)**

Policy 3 seeks to protect biodiversity, reverse biodiversity loss, deliver beneficial effects from development and strengthen nature networks with an outcome of ensuring biodiversity is enhanced and better connected.

### **Policy 4 (Natural places)**

Policy 4 seeks to protect, restore and enhance natural assets making best use of nature-based solutions.

### **Policy 5 (Soils)**

Policy 5 seeks to protect carbon-rich soils, restore peatlands and minimise disturbance to soils from development.

### **Policy 6 (Forestry, woodland and trees)**

Policy 6 seeks to protect and expand forests, woodland and trees.

### **Policy 7 (Historic assets and places)**

Policy 7 seeks to protect and enhance historic assets and places.

### **Policy 11 (Energy)**

The Policy intent is:

*“To encourage, promote and facilitate all forms of renewable energy development onshore and offshore.*

*This includes energy generation, storage, new and replacement transmission and distribution infrastructure and emerging low-carbon and zero emissions technologies including hydrogen and carbon capture utilisations and storage (CCUS)”.*

*The desired outcome of this policy is stated as an “Expansion of renewable, low carbon and zero emissions technologies”.*

LDPs are directed to seek to realise their area’s full potential for electricity and heat from renewable, low carbon and zero emissions sources by identifying a range of opportunities for energy development.

Policy 11 states:

*“a) development proposals for all forms of renewable, low carbon and zero emissions technologies will be supported. These include:*

- i. Wind farms including repowering, extending, expanding and extending the life of existing wind farms.*
- ii. Enabling works such as grid transmission and distribution infrastructure;*
- iii. Energy storage such as battery storage and pumped storage hydro;*
- vi. Small scale renewable energy generation technology;*
- v. Solar arrays;*



*vi. Proposals associated with negative emissions technologies and carbon capture; and*

*vii. Proposals including co-location of these technologies.*

*b) development proposals for wind farms in National Park and National Scenic Areas will not be supported.*

*c) development proposals will only be supported where they maximise net economic impact, including local and community socio-economic benefits such as employment, associated business and supply chain opportunities.*

*d) development proposals that impact on international or national designations will be assessed in relation to Policy 4.*

*e) in addition, project design and mitigation will demonstrate how the following impacts are addressed:*

*i. impacts on communities and individual dwellings, including, residential amenity, visual impact, noise and shadow flicker;*

*ii. significant landscape and visual impacts, recognising that some impacts are to be expected from some forms of renewable energy. Where impacts are localised and /or appropriate design mitigation has been applied, they will generally be considered to be acceptable.*

*iii. public access, including impact on long distance walking and cycling routes and scenic routes;*

*iv. impacts on aviation and defence interests including seismological recording;*

*v. impacts on telecommunications and broadcasting installations, particularly ensuring that transmission links are not compromised;*

*vi. impacts on road traffic and on adjacent trunk roads, including during construction;*

*vii. impacts on historic environment;*

*viii effects on hydrology, the water environment and flood risk;*

*ix biodiversity including impacts on birds;*

*x impacts on trees, woods and forests;*

*xi proposals for the decommissioning of developments, including ancillary infrastructure, and site restoration;*

*xii the quality of site restoration plans including the measures in place to safeguard or guarantee availability of finances to effectively implement those plans; and*

*xiii cumulative impacts.*

*In considering these impacts, significant weight will be placed on the contribution of the proposal to renewable energy generation targets and on greenhouse gas emissions reduction targets.*

*Grid capacity should not constrain renewable energy development, it is for developers to agree connections to the grid with the relevant network operator. In the case of proposals for grid infrastructure, consideration should be given to underground connections where possible.*

*f) consents for development proposals may be time limited. Areas identified for wind farms are, however, expected to be suitable for use in perpetuity.”*



## 5.2 The Local Development Plan

The local development plan is the Stirling Local Development Plan (2018). It is supported by a suite of statutory supplementary guidance.

The policy framework within the Stirling Local Development Plan (SLDP) sets out an Overarching Policy which is supported by more detailed Primary Policies, Policies and Supplementary Guidance. The Overarching Policy sets out 6 high level requirements and relates to all developments. It provides a presumption in favour of development that contributes to sustainable development as defined by the Council's Sustainable Development Criteria.

**Table 5-2** summarises the Primary Policies and Policies most relevant to the proposed development.

**Table 5-1: Most relevant LDP policies to the proposed development**

LDP Primary Policy	Policies
Primary Policy 1: Placemaking	Policy 1.1: Site Planning Policy 1.2: Design Process
Primary Policy 4: Greenhouse Gas Reduction	Policy 4.2: Protection of Carbon Rich Soils
Primary Policy 5: Flood Risk Management	Policy 5.1: Reinststate Natural Watercourses
Primary Policy 7: Historic Environment	Policy 7.1: Archaeology and Historic Building Recording Policy 7.2: Development Within and Outwith Conservation Areas Policy 7.3: Development Affecting Listed Buildings Policy 7.8: Development affecting Battlefields, Gardens and Designated Landscapes
Primary Policy 8: Conservation and Enhancement of Biodiversity	Policy 8.1: Biodiversity Duty Policy 8.2: Proposals Affecting Local Nature Conservation Sites (LNCS)
Primary Policy 9: Managing Landscape Change	Policy 9.1: Protecting Special Landscapes Policy 9.3: Landscaping and Planting in Association with Development
Primary Policy 10: Forestry, Woodlands and Trees	Policy 10.1: Development Impact on Trees and Hedgerows
Primary Policy 12: Renewable Energy	Policy 12.1: Wind Energy Development
Primary Policy 13: The Water Environment	-

It is of note that Policy 12.1 'Wind Energy Development' refers to now superseded Scottish Planning Policy and in the event of conflict between Policy 12.1 and NPF4, the provisions within NPF4 will take primacy.

### Supplementary Guidance

Supplementary Guidance that is part of the Development Plan relevant to the proposal is listed below:

- Forestry and Woodland Strategy;



- Flood Risk Management and the Water Environment;
- Historic Environment; and
- Wind Energy Developments.

The Wind Energy Supplementary Guidance is the most relevant Supplementary Guidance, however is based on the now superseded Scottish Planning Policy 2014. It provides further detail relating to LDP Policy 12.1 and maps areas where wind farms will not be acceptable (Group 1), areas of significant protection (Group 2), and areas with potential for wind farm development (Group 3). The Site lies entirely within Group 3 undesignated land with potential for wind farm development where wind farms are likely to be acceptable. It should be noted however that these areas are based on Scottish Planning Policy 2014 which is now superseded by NPF4.



## 6.0 Landscape and Visual

### 6.1 Introduction

This Section of the Scoping Report sets out the proposed methodology and approach to be applied in the production of the Landscape and Visual Impact Assessment (LVIA) to accompany the application for the proposed development. It presents the suggested scope of the LVIA in terms of those landscape and visual receptors to be scoped in and scoped out of the assessment process based on a preliminary assessment of relevant receptors to the proposed development.

The purpose of the LVIA is to identify and record the potential likely significant effects that the proposed development may have on:

- Physical elements of the landscape;
- Landscape character;
- Areas that have been designated for their scenic or landscape-related qualities; and
- Views from various locations such as settlements, routes, hilltops, and other sensitive locations.

The potential cumulative effects that may arise from the addition of the proposed development to other wind farms will also be considered.

A Residential Visual Amenity Assessment (RVAA) to assess the visual impact of the proposed development on private views and private visual amenity of individual properties within close proximity will also be considered.

The LVIA will consider the potential effects of the proposed development during the following development stages:

- Construction and decommissioning of the proposed development.
- Operation of the proposed development.

Receptors may not be affected at both development stages.

### 6.2 Legislation and Guidance

Sources of legislation and guidance that will be referenced in the LVIA include the following:

- Landscape Institute and Institute for Environmental Management and Assessment (2013) 'Guidelines for Landscape and Visual Impact Assessment: Third Edition' ('GLVIA3')<sup>16</sup>
- SNH and The Countryside Agency (TCA) (2002). Landscape Character Assessment Guidance for England and Scotland<sup>17</sup>
- SNH (2017). Visual Representation of Wind Farms Version 2.2<sup>18</sup>

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<sup>16</sup> Landscape Institute and Institute for Environmental Management and Assessment (2013) 'Guidelines for Landscape and Visual Impact Assessment: Third Edition' ('GLVIA3'). [Online] Available at: <https://www.landscapeinstitute.org/technical/glvia3-panel/>. Accessed 19.06.2024

<sup>17</sup> SNH and The Countryside Agency (TCA) (2002). Landscape Character Assessment Guidance for England and Scotland. Available at: [https://digital.nls.uk/pubs/e-monographs/2020/216649977\\_23.pdf](https://digital.nls.uk/pubs/e-monographs/2020/216649977_23.pdf) Accessed 19.06.2024

<sup>18</sup> SNH (2017) Visual Representation of Wind Farms Version 2.2. Available at: <https://www.nature.scot/sites/default/files/2019-09/Guidance%20-%20Visual%20representation%20of%20wind%20farms%20-%20Feb%202017.pdf> Accessed: 19.06.2024



- NatureScot (2021). Assessing the Cumulative Impact of Onshore Wind Energy Developments<sup>19</sup>
- Landscape Institute (2019). Visual Representation of Development Proposals: Landscape Institute Technical Guidance Note 06/19<sup>20</sup>
- NatureScot (2020). Assessing Impacts on Wild Land Areas Technical Guidance<sup>21</sup>
- SNH (2017). Descriptions of Wild Land Areas<sup>22</sup>
- SNH (2010). The special qualities of the National Scenic Areas. Scottish Natural Heritage Commissioned Report No. 374<sup>23</sup>
- NatureScot (DRAFT 2018-2019 or as updated). Guidance for Assessing the Effects on Special Landscape Qualities<sup>24</sup>
- Landscape Institute (2019). Technical Guidance Note 2/19 Residential Visual Amenity Assessment<sup>25</sup>
- SNH (2017). Siting and Designing of Windfarms in the Landscape: Version 3a<sup>26</sup>

### 6.3 Proposed LVIA Study Areas

In accordance with guidance and with a proposed wind turbine height of up to 200m, the LVIA Study Area for the assessment of the proposed development will cover a radius of 45km from the nearest proposed wind turbine, as shown in **Figure 6**. This is considered to be the maximum radius within which a significant landscape and/or visual effect could occur, given the height of the wind turbines that are being considered.

Following a review of the Zone of Theoretical Visibility (ZTV) (**Figures 7 and 8**) for the proposed development, a smaller Detailed LVIA (DLVIA) Study Area with a radius of 20km will be more appropriate to identify any potential significant landscape character effects. Similarly, it is proposed that the cumulative assessment is focussed upon a 20km Cumulative LVIA (CLVIA) Study Area. Further justification for the CLVIA Study Area is provided in Section 6.8.1 Zone of Theoretical Visibility (ZTV) Overview.

In relation to residential visual receptors, it is proposed that an RVAA will be undertaken. In line with current guidance. The RVAA will include properties that lie within 2km of the proposed wind turbines.

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<sup>19</sup> NatureScot (2021). Assessing the Cumulative Impact of Onshore Wind Energy Developments. Available at: <https://www.nature.scot/doc/guidance-assessing-cumulative-landscape-and-visual-impact-onshore-wind-energy-developments> Accessed: 19.06.2024

<sup>20</sup> Landscape Institute (2019). Visual Representation of Development Proposals: Landscape Institute Technical Guidance Note 06/19. Available at: [https://www.landscapeinstitute.org/wp-content/uploads/2019/09/LI\\_TGN-06-19\\_Visual\\_Representation-1.pdf](https://www.landscapeinstitute.org/wp-content/uploads/2019/09/LI_TGN-06-19_Visual_Representation-1.pdf) Accessed: 19.06.2024

<sup>21</sup> NatureScot (2020). Assessing Impacts on Wild Land Areas Technical Guidance. Available at: <https://www.nature.scot/doc/assessing-impacts-wild-land-areas-technical-guidance> Accessed: 19.06.2024

<sup>22</sup> SNH (2017). Descriptions of Wild Land Areas. Available at: <https://www.nature.scot/doc/wild-land-areas-map-and-descriptions-2014> Accessed: 19.06.2024

<sup>23</sup> SNH (2010). The special qualities of the National Scenic Areas. Scottish Natural Heritage Commissioned Report No. 374. Available at: <https://www.nature.scot/doc/naturescot-commissioned-report-374-special-qualities-national-scenic-areas> Accessed: 19.06.2024

<sup>24</sup> NatureScot (DRAFT 2018-2019 or as updated). Guidance for Assessing the Effects on Special Landscape Qualities. Available at: <https://www.nature.scot/professional-advice/protected-areas-and-species/protected-areas/national-designations/national-scenic-areas/nsa-special-qualities> Accessed: 19.06.2024

<sup>25</sup> Landscape Institute (2019). Technical Guidance Note 2/19 Residential Visual Amenity Assessment. Available at: <https://www.landscapeinstitute.org/technical-resource/rvaa/> Accessed: 19.06.2024

<sup>26</sup> SNH (2017). Siting and Designing of Windfarms in the Landscape: Version 3a. Available at: <https://www.nature.scot/doc/siting-and-designing-wind-farms-landscape-version-3a> Accessed: 19.06.2024



## 6.4 Proposed Surveys to Inform the LVIA

The analysis of key receptors within this Scoping Report has been carried out based on a good working knowledge of the LVIA Study Area and detailed desk study and Geographic Information Systems (GIS) analysis. To inform the LVIA and layout design process, field surveys will be undertaken throughout the LVIA Study Area. Field surveys will be concentrated within the areas shown on the ZTV to gain theoretical visibility of the proposed development. The field survey work will include visits to viewpoints as well as extensive travel around the LVIA Study Area to consider potential effects (including cumulative) on landscape character and on the experience of views seen from travel routes through the landscape. These visits will allow the landscape character and the visual amenity of the LVIA Study Area to be experienced in a range of different conditions and seasonal variation, including at night-time in relation to lighting. The field survey will also allow the assessors to judge the likely scale, distance, extent, and prominence of the proposed development directly. Viewpoint photography will be captured during field survey visits in periods of good visibility.

## 6.5 Proposed Assessment Methodology

The LVIA will follow Optimised Environment's (OPEN's) methodology devised specifically for the assessment of wind farm developments which accords with 'Guidelines for Landscape and Visual Impact Assessment: Third Edition' (Landscape Institute and IEMA, 2013) ('GLVIA3'), the key source of guidance for LVIA. Other sources of guidance that will be used and referenced in the LVIA are listed in Section 6.2 Legislation and Guidance of this Scoping Report.

This Scoping Report has included a desk study of the Site, the 45km LVIA Study Area and is combined with a good working knowledge of the immediate context of the Stirling Hills. Aspects of the landscape and visual resource that will be considered in the LVIA, are identified as follows:

- Landscape character typology;
- Landscape-related planning designations;
- Properties and settlements;
- Routes (including roads, railways, cycle routes and long-distance walking routes);
- Recreation (such as boating or angling on the Carron Valley Reservoir, bird watching and using trails within Carron Forest and surrounding area); and
- Potential cumulative wind farms.

The desk study has also utilised GIS software to explore the potential visibility of the proposed development. The resultant ZTV diagrams (**Figures 7 to 12**) have provided an indication of which landscape and visual receptors are likely to have key sensitivities to the proposed development.

The LVIA is intended to determine the significant effects that the proposed development would have on the landscape and visual resource. For the purpose of assessment, the potential effects on the landscape and visual resource are grouped into the following categories:

- Physical effects: physical effects are restricted to the area within the Site and are the direct effects on the existing fabric of the Site. This category of effects is made up of landscape elements, which are the components of the landscape such as rough grassland and coniferous forestry that may be directly and physically affected by the proposed development.





- Effects on landscape character: landscape character is the distinct and recognisable pattern of elements that occurs consistently in a particular type of landscape and the way that this pattern is perceived. Effects on landscape character arise either through the introduction of new elements that physically alter this pattern of elements or through visibility of the proposed development that may alter the way in which the pattern of elements is perceived. This category of effects is made up of landscape character receptors, which fall into two groups - landscape character types and landscape-related designated areas.
- Effects on views: the assessment of the effects on views is an assessment of how the introduction of the proposed development would affect views throughout the LVIA Study Area. The assessment of effects on views is carried out in relation to representative viewpoints and principal visual receptors. An assessment of the night-time visual effects from visible aviation lighting will also be undertaken.
- Effects on views from properties: RVAA is carried out for properties within 2km of the proposed turbines, in line with Landscape Institute technical guidance.
- Cumulative effects: cumulative effects arise where the LVIA Study Areas for two or more wind farms overlap so that both of the wind farms are experienced at a proximity where they may have a greater incremental effect, or where wind farms may combine to have a sequential effect. In accordance with guidance, the LVIA assesses the effect arising from the addition of the proposed development to the cumulative situation.

The objective of the assessment of the proposed development is to predict the likely significant effects on the landscape and visual resource. In line with the EIA Regulations, the LVIA effects are assessed to be either significant or not significant.

The significance of effects is assessed through a combination of two considerations: the sensitivity of the landscape receptor or view, and the magnitude of change that would result from the addition of the proposed development.

The geographic extent over which the landscape and visual effects would be experienced is also assessed, which is distinct from the size or scale of effect (as determined by the magnitude of change). This evaluation is not combined in the assessment of the level of magnitude but instead is used in determining the extent in which a particular magnitude of change is experienced and the extent of the significant and non-significant effects. The extent of the effects would vary depending on the specific nature of the development proposed and is principally assessed through analysis of the geographical extent of visibility of the proposed development across the visual receptor.

The duration and reversibility of effects on views are based on the period over which the proposed development is likely to exist and the extent to which the proposed development will be removed and its effects reversed at the end of that period. Duration and reversibility are not incorporated into the overall magnitude of change and may be stated separately in relation to the assessed effects. The nature of effect relates to whether the effects of the proposed development are adverse, neutral, or beneficial. OPEN generally adopts a precautionary approach which assumes that significant landscape and visual effects will be weighed on the negative side of the planning balance, although positive or neutral effects may arise in certain situations.

## 6.6 Approach to Mitigation

The design and layout of the proposed wind turbines and associated infrastructure is a vital part of the EIA process and is the stage where the biggest contribution can be made to mitigate potential landscape and visual effects. A key design objective will be creating a wind farm which is appropriate for the existing landscape character and visual features of the





area. The design of the proposed development will evolve as part of an iterative process which aims to provide an optimal design in environmental, as well as technical and economic terms, and the mitigation of landscape and visual effects will be a central consideration in this process.

## 6.7 Baseline Context

The proposed development is located to the south west of Stirling on Cairnoch Hill (410m AOD) which lies to the north of the Carron Valley Reservoir. The Fintry, the Gargunnock and Touch Hills, and the Kilsyth Hills surround and enclose the reservoir to the west, north and south respectively. The sinuous and wooded edge of the reservoir and the containment provided by the largely unsettled and often forested hills has created an area which feels more remote than it is. Stirling lies approximately 10km to the north east and the outer edges of Glasgow conurbation 15km to the south west, with the centre of Glasgow approximately 22km distant.

At the eastern end of the reservoir is the small settlement of Craigannet, with the row of large, white-painted houses a noticeable feature above the dam. Carron Valley Forestry Commission car park is situated in woodland south of the River Carron. It is a popular location for recreation, including mountain biking, with multiple trails to the south of the reservoir through forestry plantation, which is in several stages of the forestry cycle. Other promoted activities include bird watching, angling, as well as walks or hikes to the surrounding low hills. Duncarron Medieval Village visitor attraction is located close to the car park.

North of the reservoir and the Site, the landscape of the Gargunnock and Touch Hills is open, large-scale moorland that is used for hill grazing, with very limited scattered settlement. A number of wind farms are located in this area including Earlsburn North to the north west, Earlsburn to the north, Craigengelt Wind Farm and the single turbine of Craigannet are located to the east of the Site. These wind farms are visible only at the eastern and western edges of the reservoir, with Cairnoch Hill and Craigannet Hill to the north of the reservoir providing screening in views north. Several reservoirs, as well as a number of masts on Earl's Hill are found within the Gargunnock and Touch Hills, along with large blocks of coniferous forestry.

Glasgow is located to the south west, with transportation links extending out from it. The M80 runs from Glasgow north east to Denny to the east of the Site, then north to Stirling. Access to Carron Valley is via the B818 which runs east to west between Denny on the M80 and the A875 near Killearn. North of the Gargunnock and Touch Hills, the A811 runs along the broad farmed valley of the River Forth from Stirling to Alexandria on the A82. The A84 heads north from Stirling through the Forth Valley towards Lochearnhead, skirting around the Lowland Hills surrounding the popular Ben Vorlich to the south of Loch Earn. East of Denny are Falkirk and Grangemouth that can be reached from the M9 from Edinburgh. The Firth of Forth estuary stretches eastwards from Grangemouth. A number of A roads including the A891 skirt the southern edges of the Campsie Fells. At Strathblane, south west of the Campsie Fells the A81 heads north along the Blane Water valley north to Aberfoyle.

West and north west of the Campsie Fells on the far side of Endrick Water is the Loch Lomond and Trossachs National Park (approximately 16km from the nearest turbine of the proposed development). A number of long distance walking routes cross through the LVIA Study Area including the John Muir way (approximately 8.4km to the closest proposed turbine) which runs east-west to the south of the Campsie Fells from the south coast of the Firth of Forth and the West Highland Way (approximately 16.1km to the closest proposed turbine) which runs largely north-south to the west of the Campsie Fells. To the south largely following the River Kelvin is the Antonine Wall World Heritage Centre (approximately 8.8km from the boundary to the closest proposed turbine).



## 6.8 Potential Significant Effects of the Proposed Development

### 6.8.1 Zone of Theoretical Visibility (ZTV) Overview

The blade tip ZTV is shown alongside landscape designations, wild land, landscape character, and visual receptors on **Figures 9 to 12**; alongside viewpoints on **Figure 7**; and on more detailed 50km mapping on **Figure 8** which, for greater legibility of the immediate context, has been produced for an approximate 20km area. Within 10km of the Site, the blade tip theoretical visibility is contained by the Kilsyth Hills and Campsie Fells to the south and west, and the Gargunnoch Hills to the north west, Touch Hills to the north east and smaller hills to the east including Craigengelt Hill and Dundaff Hill. Beyond 10km there is theoretical visibility to the west along Endrick Water and the surrounding lowland hills towards Loch Lomond, and to the summits on the far side including Beinn Chaorach (713m AOD). North of the River Forth valley there will be theoretical visibility from hill summits of the Achray Forest and peaks further north including Ben Venue, Ben Ledi and Ben Vorlich and surrounding summits. Eastwards, there is theoretical visibility to the east of the M80 including Stirling, Grangemouth, Falkirk and Dunfermline and surrounding hills. South, there is patchy visibility of between one and four blades on the far side of the River Kelvin and across parts of Glasgow and the central belt. There is theoretical visibility to the south west of between one and three blade tips across the eastern summits of the Kilpatrick Hills and the more distant Queenside Muir.

### 6.8.2 Landscape Character

In early 2019, NatureScot published an update to the characterisation of Scotland's landscape as a digital resource. The information builds on the characterisation studies published in the 1990's. NatureScot describe the recent publication as now superseding the 1990's landscape character descriptions and mapping, adding that 'Where there are topic-specific landscape capacity or sensitivity studies, they would take precedence for informing that development type, e.g. windfarms.' The proposed development would be located within Lowland Hills – Central LCT 149.

The key 'topic specific' characterisation studies relevant to the LVIA Study Area are the Stirling Council Supplementary Guidance Wind Energy Development (2019) (SCSGWED), North Lanarkshire Council Landscape Capacity Study for Wind Turbine Development Background Report (2018) and Falkirk Council Spatial Framework and Guidance for Wind Energy Development Supplementary Guidance SG14 (2015). These sources of information in addition to the NatureScot LCT characterisation, therefore, form the most up to date characterisation studies across the LVIA Study Area and as such form the context of landscape characterisation baseline for the LVIA.

Based on the overview of theoretical visibility of the proposed development described in Section 6.8.1 ZTV Overview, it is considered that the potential for significant landscape character effects may only arise within an area of no more than 20km radius from the proposed wind turbines. As such it is proposed that the landscape character assessment will focus on this area. In particular, the landscape character assessment will focus on assessing the likely significant effects on the LCT in which the proposed development is located, where the proposed development may result in direct effects on the pattern of elements that comprise the landscape character, together with LCTs in the immediately adjacent area where the proposed development may result in indirect effects on the perception of the landscape character.

### 6.8.3 Landscape Designations

The proposed development lies within the local tier landscape designation Southern Hills Local Landscape Area (LLA), as shown on **Figure 9**. Within the surrounding area are a



number of local tier landscape designations including the Kilsyth Hills Special Landscape Area (SLA) approximately 1.6km to the south and Denny Hills LLA approximately 3.9km to the south east.

No part of the Site or the immediate surrounding area is subject to any form of nationally important landscape designation. Within the LVIA Study Area a number of nationally important landscape designations are found, including The Trossachs National Scenic Area (NSA), Loch Lomond NSA, the Loch Lomond and Trossachs National Park (LLTNP) and the Antonine Wall World Heritage Site (WHS).

**Table 6-1** below lists the designated areas and provides information about their distance to the proposed development and relationship to the ZTV, as shown in **Figure 9**. Thereafter, it is assessed in the final column whether or not, in OPEN’s opinion, these designated areas can be scoped out of the assessment, unless changes to the layout during the detailed design process materially alter the potential for significant effects.

**Table 6-1: Preliminary Assessment of Landscape Designations**

Landscape Designation	Approximate distance to Proposed Development (km)	Theoretical visibility? Yes/ No	Include in detailed assessment within LVIA?
The Trossachs NSA	21.3km	Yes	No. The ZTV indicates very limited theoretical visibility from summits and potential significant effects are limited by distance.
Lomond Hills NSA	21.3km	Yes	No. The ZTV indicates theoretical visibility from east and south-east facing slopes, however potential significant effects are limited by distance.
Loch Lomond and Trossachs National Park	16km	Yes	No. The ZTV indicates theoretical visibility from east facing slopes, however potential significant effects are limited by distance and that the proposed development would be visible within the context of existing wind farms.
Antonine Wall WHS	8.8km	No	No. The ZTV indicates that there is no theoretical visibility throughout the WHS. There is no potential for significant effects.
Southern Hills LLA	0km	Yes	Yes. Included in detailed assessment due to the location of the proposed development within this LLA.
Kilsyth Hills SLA	1.6km	Yes	Yes. Included in detailed assessment due to theoretical visibility across the hills to the south of Carron Valley Reservoir.
Denny Hills SLA	3.9km	Yes	Yes. Included in detailed assessment due to theoretical visibility across north-west facing slopes.
Western Ochils LLA	14.4km	Yes	No. The ZTV indicates that there is limited theoretical visibility at closer ranges, and where there is more visibility from summits due to distance there is no potential for significant effects.



Landscape Designation	Approximate distance to Proposed Development (km)	Theoretical visibility? Yes/ No	Include in detailed assessment within LVIA?
Keir LLA	13.8km	Yes	No. The ZTV indicates that there is limited theoretical visibility of between one and three blade tips such that there is no potential for significant effects.
Kirkpatrick Hill (Stirling) LLA	17.3km	No	No. The ZTV indicates that there is no theoretical visibility throughout the LLA. There is no potential for significant effects.
Uamh Bheag LLA	22.2km	Yes	No. The ZTV indicates that there is limited theoretical visibility, and in combination with distance there is no potential for significant effects.
Rednock LLA	15.6km	Yes	No. The ZTV indicates that there is limited theoretical visibility such that there is no potential for significant effects.
Upper Forth LLAs	25.8km	Yes	No. The ZTV indicates theoretical visibility across these LLAs strung along the northern coastline of the Firth of Forth, however potential significant effects are limited by distance.
Slamannan Plateau/Avon Valley SLA	17.2km	Yes	No. The ZTV indicates theoretical visibility from west facing slopes, however potential significant effects are limited by distance.
South Bo'ness SLA	25km	Yes	No. The ZTV indicates theoretical visibility from west facing slopes, however potential significant effects are limited by distance.
Lower Clyde & Calderglen SLA	23.19km	Yes	No. The ZTV indicates that there is theoretical visibility of between two and three turbines, however potential significant effects are limited by distance.
Middle Clyde Valley SLA	29.28km	Yes	No. The ZTV indicates that there is theoretical visibility of between two and three turbines, however potential significant effects are limited by distance.
Kilpatrick Hills LLA	17.57km	Yes	No. The ZTV indicates that there is very limited theoretical visibility such that there is no potential for significant effects.
Bardowie, Baldernock and Torrance LLA	11.77km	No	No. The ZTV indicates that there is no theoretical visibility throughout the LLA. There is no potential for significant effects.
Glazert Valley LLA	8km	No	No. The ZTV indicates that there is no theoretical visibility throughout the LLA. There is no potential for significant effects.
Campsie Fells LLA	3.7km	Yes	Yes. Included in detailed assessment due to theoretical visibility across the north-eastern part of the LLA.



Landscape Designation	Approximate distance to Proposed Development (km)	Theoretical visibility? Yes/ No	Include in detailed assessment within LVIA?
Bar Hill LLA	8.3km	No	No. The ZTV indicates that there is no theoretical visibility throughout the LLA. There is no potential for significant effects.
Clyde Valley SLA	29.1km	Yes	No. The ZTV indicates that there is theoretical visibility of between two and three turbines, however potential significant effects are limited by distance.
Ochil Hills LLA	22.7km	Yes	No. The ZTV indicates that there is very limited theoretical visibility such that there is no potential for significant effects.
Loch Lomond LLA	35.8km	Yes	No. The ZTV indicates theoretical visibility from the east facing slopes, however potential significant effects are limited by distance.
Creag Gharbh LLA	38.8km	No	No. The ZTV indicates that there is no theoretical visibility within the LVIA Study Area. There is no potential for significant effects.
South West Dunfermline LLA	35.2km	Yes	No. The ZTV indicates theoretical visibility from the west facing slopes, however potential significant effects are limited by distance.
Upper Forth LLA	35.9km	Yes	No. The ZTV indicates theoretical visibility from the west facing slopes, however potential significant effects are limited by distance.
Cleish Hills LLA	32.5km	Yes	No. The ZTV indicates theoretical visibility from the west facing slopes, however potential significant effects are limited by distance.
Upper Strathearn LLA	33.3km	Yes	No. The ZTV indicates that there is very limited theoretical visibility such that there is no potential for significant effects.
Loch Long (Coast) LLA	43.52km	No	No. The ZTV indicates that there is no theoretical visibility throughout the LLA. There is no potential for significant effects.
Letham Hill LLA	42.97km	Yes	No. The ZTV indicates theoretical visibility from the west facing slopes, however potential significant effects are limited by distance.
Cullaloe Hills and Coast LLA	43.22km	Yes	No. The ZTV indicates theoretical visibility from the west facing slopes, however potential significant effects are limited by distance.
Ferry Hills LLA	41.74km	Yes	No. The ZTV indicates theoretical visibility from the west facing slopes, however



Landscape Designation	Approximate distance to Proposed Development (km)	Theoretical visibility? Yes/ No	Include in detailed assessment within LVIA?
			potential significant effects are limited by distance.
Pentland Hills and Black Mount SLA	43.5km	Yes	No. The ZTV indicates theoretical visibility from the northwest facing slopes, however potential significant effects are limited by distance.
Southern Forth Coast SLA	42.8km	Yes	No. The ZTV indicates theoretical visibility from the west facing slopes, however potential significant effects are limited by distance.
Dundas SLA	41.3km	Yes	No. The ZTV indicates that there is very limited theoretical visibility such that there is no potential for significant effects.
Ratho Hills SLA	44.3km	Yes	No. The ZTV indicates that there is very limited theoretical visibility such that there is no potential for significant effects.
Upper Almond SLA	42.2km	No	No. The ZTV indicates that there is no theoretical visibility throughout the SLA. There is no potential for significant effects.
Loch Leven and Lomond Hills LLA	44.1km	No	No. The ZTV indicates that there is no theoretical visibility within the LVIA Study Area. There is no potential for significant effects.
Bathgate Hills SLA	24.3km	Yes	No. The ZTV indicates theoretical visibility from northwest facing slopes, however potential significant effects are limited by distance.
Airngath Hill SLA	28.8km	Yes	No. The ZTV indicates theoretical visibility from northwest facing slopes, however potential significant effects are limited by distance.
Blackridge Heights SLA	23.5km	Yes	No. The ZTV indicates theoretical visibility from northwest facing slopes, however potential significant effects are limited by distance.
Forth Coast SLA	34.7km	Yes	No. The ZTV indicates theoretical visibility from northwest facing slopes, however potential significant effects are limited by distance.
Pentland Hills SLA	42.8km	Yes	No. The ZTV indicates theoretical visibility from northwest facing slopes, however potential significant effects are limited by distance.
Almond and Linhouse Valley SLA	40.9km	Yes	No. The ZTV indicates that there is very limited theoretical visibility such that there is no potential for significant effects.





Landscape Designation	Approximate distance to Proposed Development (km)	Theoretical visibility? Yes/ No	Include in detailed assessment within LVIA?
The Roman Camp	21.9km	No	No. The ZTV indicates that there is no theoretical visibility throughout the GDL. There is no potential for significant effects.
Kippenross	16.0km	Yes	No. The ZTV indicates that there is limited theoretical visibility of between one and three blade tips such that there is no potential for significant effects.
Cardross House	13.6km	Yes	No. The ZTV indicates that there is very limited theoretical visibility such that there is no potential for significant effects.
Castle Campbell	28.8km	Yes	No. The ZTV indicates that there is very limited theoretical visibility such that there is no potential for significant effects.
Inchmahome Priory	18.3km	Yes	No. The ZTV indicates limited theoretical visibility, however potential significant effects are limited by distance.
Callendar Park	18.8km	Yes	No. Whilst the ZTV indicates theoretical visibility throughout the park, due to the wooded nature of the park this restricts visibility to the wider landscape including to the northwest where the proposed development would be located. No potential significant effects.
Victoria Park	23.4km	No	No. The ZTV indicates that there is no theoretical visibility throughout the GDL. There is no potential for significant effects.
Overtoun House	27.3km	No	No. The ZTV indicates that there is no theoretical visibility throughout the GDL. There is no potential for significant effects.
Kelvingrove Park	22.2km	No	No. The ZTV indicates that there is no theoretical visibility throughout the GDL. There is no potential for significant effects.
Braco	27.4km	Yes	No. The ZTV indicates theoretical visibility from southwest facing slopes, however potential significant effects are limited by distance.
Dunimarle Castle	26.6km	Yes	No. The ZTV indicates theoretical visibility from west facing slopes, however potential significant effects are limited by distance.
Doune Park	17.0km	No	No. The ZTV indicates that there is no theoretical visibility throughout the GDL. There is no potential for significant effects.
Rednock House	16.4km	Yes	No. The ZTV indicates that there is very limited theoretical visibility such that there is no potential for significant effects.



Landscape Designation	Approximate distance to Proposed Development (km)	Theoretical visibility? Yes/ No	Include in detailed assessment within LVIA?
Blair Drummond	12.8km	No	No. The ZTV indicates that there is no theoretical visibility throughout the GDL. There is no potential for significant effects.
Keir	14.3km	Yes	No. The ZTV indicates that there is limited theoretical visibility of between one and three blade tips such that there is no potential for significant effects.
Airthrey Castle	14.5km	Yes	No. Whilst the ZTV shows that there is theoretical visibility of up to three blade tips across the GDL, vegetation and woodland screen views to the wider landscape from most locations, including towards the proposed development such that there is no potential for significant effects.
Duntreath Castle	14.9km	No	No. The ZTV indicates that there is no theoretical visibility throughout the GDL. There is no potential for significant effects.
Gargunnock House	8.5km	No	No. The ZTV indicates that there is no theoretical visibility throughout the GDL. There is no potential for significant effects.
Kings Knot	11.7km	No	No. The ZTV indicates that there is no theoretical visibility throughout the GDL. There is no potential for significant effects.
Touch	7.4km	No	No. The ZTV indicates that there is no theoretical visibility throughout the GDL. There is no potential for significant effects.
Dunmore Park	17.0km	Yes	No. The ZTV indicates theoretical visibility from west facing slopes, however potential significant effects are limited by distance.
Tulliallan	22.5km	Yes	No. The ZTV indicates theoretical visibility from west facing slopes, however potential significant effects are limited by distance.
The Pineapple	18.4km	Yes	No. The ZTV indicates theoretical visibility from west facing slopes, however potential significant effects are limited by distance.
Valleyfield	29.3km	Yes	No. The ZTV indicates theoretical visibility from west facing slopes, however potential significant effects are limited by distance.
Ross Priory	26.4km	Yes	No. The ZTV indicates theoretical visibility from east facing slopes, however potential significant effects are limited by distance.
Culross Abbey House	28.0km	Yes	No. The ZTV indicates theoretical visibility from west facing slopes, however potential significant effects are limited by distance.





Landscape Designation	Approximate distance to Proposed Development (km)	Theoretical visibility? Yes/ No	Include in detailed assessment within LVIA?
Balloch Castle	29.2km	No	No. The ZTV indicates that there is no theoretical visibility throughout the GDL. There is no potential for significant effects.
Glasgow Botanic Gardens	21.5km	No	No. The ZTV indicates that there is no theoretical visibility throughout the GDL. There is no potential for significant effects.
The Necropolis	21.7km	No	No. The ZTV indicates that there is no theoretical visibility throughout the GDL. There is no potential for significant effects.
Cowane's Hospital	12.0km	Yes	No. The ZTV shows that there is some very limited theoretical visibility, such that there is no potential for significant effects.
Pollok Park (Nether Pollok)	26.2km	No	No. The ZTV indicates that there is no theoretical visibility throughout the GDL. There is no potential for significant effects.
Milngavie Reservoirs	15.4km	No	No. The ZTV indicates that there is no theoretical visibility throughout the GDL. There is no potential for significant effects.
Colzium Lennox Estate	6.6km	No	No. The ZTV indicates that there is no theoretical visibility throughout the GDL. There is no potential for significant effects.
Rossdhu	32.1km	Yes	No. The ZTV indicates theoretical visibility from east facing slopes, however potential significant effects are limited by distance.
Rouken Glen Park	30.5km	Yes	No. The ZTV indicates very limited theoretical visibility from northeast facing slopes, however potential significant effects are limited by distance.
Duchal House	36.7km	No	No. The ZTV indicates that there is no theoretical visibility throughout the GDL. There is no potential for significant effects.
Cleish Castle	39.4km	No	No. The ZTV indicates that there is no theoretical visibility throughout the GDL. There is no potential for significant effects.
Ochertyre	39.7km	No	No. The ZTV indicates that there is no theoretical visibility throughout the GDL. There is no potential for significant effects.
House of The Binns	34.7km	Yes	No. Very limited theoretical visibility such that there is no potential for significant effects.
Formakin	30.4km	No	No. The ZTV indicates that there is no theoretical visibility throughout the GDL. There is no potential for significant effects.
Pittencrieff Park	37.8km	Yes	No. The ZTV indicates very limited theoretical visibility from northeast facing



Landscape Designation	Approximate distance to Proposed Development (km)	Theoretical visibility? Yes/ No	Include in detailed assessment within LVIA?
			slopes, however potential significant effects are limited by distance.
Greenbank Garden	31.6km	Yes	No. The ZTV indicates very limited theoretical visibility from northeast facing slopes, however potential significant effects are limited by distance.
Dalzell House	30.2km	No	No. The ZTV indicates that there is no theoretical visibility throughout the GDL. There is no potential for significant effects.
Chatelherault (Wham)	30.4km	Yes	No. The ZTV indicates very limited theoretical visibility from north facing slopes, however potential significant effects are limited by distance.
Barncluith	30.68km	Yes	No. The ZTV indicates very limited theoretical visibility from north facing slopes, however potential significant effects are limited by distance.
Aberuchill Castle	34.97km	No	No. The ZTV indicates that there is no theoretical visibility throughout the GDL. There is no potential for significant effects.
Dunira	37.36km	No	No. The ZTV indicates that there is no theoretical visibility throughout the GDL. There is no potential for significant effects.
Drummond Castle	34.02km	No	No. The ZTV indicates that there is no theoretical visibility throughout the GDL. There is no potential for significant effects.
Cowden Japanese-Style Garden	30.97km	Yes	No. The ZTV indicates very limited theoretical visibility from southwest facing slopes, however potential significant effects are limited by distance.
Finlaystone House	33.53km	No	No. The ZTV indicates that there is no theoretical visibility throughout the GDL. There is no potential for significant effects.
Hopetoun House	37.07km	Yes	No. The ZTV indicates very limited theoretical visibility from west facing slopes, however potential significant effects are limited by distance.
Gleneagles Hotel And Golf Courses	31.81km	No	No. The ZTV indicates that there is no theoretical visibility throughout the GDL. There is no potential for significant effects.
The Falls of Clyde	44.36km	Yes	No. Very limited theoretical visibility such that there is no potential for significant effects.
Monzie Castle	41.67km	No	No. The ZTV indicates that there is no theoretical visibility throughout the GDL. There is no potential for significant effects.



Landscape Designation	Approximate distance to Proposed Development (km)	Theoretical visibility? Yes/ No	Include in detailed assessment within LVIA?
Fordell Castle	43.23km	Yes	No. The ZTV indicates limited theoretical visibility from west facing slopes, however potential significant effects are limited by distance.
Kinross House	44.67km	Yes	No. Very limited theoretical visibility such that there is no potential for significant effects.
Dalmeny	43.64km	Yes	No. The ZTV indicates theoretical visibility from west facing slopes, however potential significant effects are limited by distance.
Dundas Castle	41.16km	Yes	No. The ZTV indicates theoretical visibility from west facing slopes, however potential significant effects are limited by distance.
Newliston	40.51km	No	No. The ZTV indicates that there is no theoretical visibility throughout the GDL. There is no potential for significant effects.
Hatton House	44.93km	No	No. The ZTV indicates that there is no theoretical visibility throughout the GDL. There is no potential for significant effects.
Harburn House	40.97km	Yes	No. The ZTV indicates very limited theoretical visibility from west facing slopes, however potential significant effects are limited by distance.
Lee Castle	40.5km	Yes	No. The ZTV indicates very limited theoretical visibility from northwest facing slopes, however potential significant effects are limited by distance.
Abercairny	40.55km	No	No. The ZTV indicates that there is no theoretical visibility throughout the GDL. There is no potential for significant effects.
Invermay	44.3km	No	No. The ZTV indicates that there is no theoretical visibility throughout the GDL. There is no potential for significant effects.
Glenarn	41.05km	No	No. The ZTV indicates that there is no theoretical visibility throughout the GDL. There is no potential for significant effects.
Blair Adam	42.97km	No	No. The ZTV indicates that there is no theoretical visibility throughout the GDL. There is no potential for significant effects.

#### 6.8.4 Wild Land

There are two Wild Land Areas (WLAs) within the LVIA Study Area. WLA 07: Ben More – Ben Ledi approximately 24km to the north west of the proposed development, and WLA 04: Waterhead Moor – Muirshiel approximately 44km to the south west. WLA 07 is located within the LLTNP which covers the ridgeline of mountains between Ben More and Ben Ledi and the northern part of Loch Katrine. WLA 04 covers the moorland hills to the east of Largs.



The WLAs are shown on **Figure 10** along with the blade tip ZTV. Across WLA 07 theoretical visibility of the proposed development is limited to summits, is relatively distant in excess of 24km, with a number of operational wind farms to the north of the proposed development and the intervening settled and farmed River Forth valley influencing the WLA at closer proximity. Theoretical visibility of the proposed development is more widespread across WLA 04, however between one and three blade tips will be visible, at a distance in excess of 44 km with the conurbation of Glasgow and a number of wind farms at a closer proximity. Taking this into account, it is considered there is no potential for significant effects to either WLA 04 or WLA 07 and that a specific detailed assessment of effects of the proposed development on wild land is not required in the LVIA and is scoped out.

### 6.8.5 Visual Receptors and Visual Amenity

The LVIA will undertake an assessment of the likely visual effects of the proposed development through consideration of the specific visual effects at a selection of representative viewpoints and by considering the wider effects on visual amenity with reference to principal visual receptors (principal visual receptors are shown on **Figure 12** with blade tip ZTV, and viewpoints are shown on **Figures 7 and 8**). In relation to residential visual receptors, it is proposed that a RVAA will be undertaken. In line with current guidance, the RVAA will include properties, or groups of properties that lie within 2km of the proposed wind turbines. A night-time assessment of the effects from visible aviation lighting on the turbines will be undertaken within the LVIA.

### 6.8.6 Viewpoint Selection

A preliminary viewpoint list is shown in **Table 6-2** below. The proposed representative viewpoint locations are shown on **Figures 7 and 8**. The preliminary viewpoints were selected to represent a range of visual receptors within the LVIA Study Area based on an initial review of the Site and surrounding landscape and visual resource. They were selected to represent landscape receptors and in consideration of the potential for cumulative effects to arise. **Appendix 03** provides wirelines of the proposed development from the viewpoints proposed in **Table 6-2**. The final list will be established in agreement with NatureScot, Stirling Council, other relevant authorities, through further fieldwork and with regard to the scoping responses. Visualisations and Figures will be produced to NatureScot standards, as set out in 'Visual Representation of Wind farms: Version 2.2' (February 2017). In line with NatureScot guidance, it is proposed that photomontages will be prepared for viewpoints where they are located within a 20km radius of the outermost proposed wind turbines.

**Table 6-2: Preliminary Representative Viewpoint Locations**

ID	Viewpoint Name	Grid Ref (preliminary)		Distance to nearest proposed wind turbine (km)	Receptors Represented	Landscape Character / Landscape Designation
		Easting	Nothing			
1	Minor road near Easter Cringate	270300	686750	1.0	Residents Road users	Lowland Hills – Central LCT 149 Southern Hills LLA
2	Minor road near Easter Cringate Cottage	271742	687462	0.7	Residents Road users	Lowland Hills – Central LCT 149 Southern Hills LLA



ID	Viewpoint Name	Grid Ref (preliminary)		Distance to nearest proposed wind turbine (km)	Receptors Represented	Landscape Character / Landscape Designation
		Easting	Nothing			
3	Easter Buckieburn	275388	685665	2.7	Residents Road users	Lowland Hills – Central LCT 149 Southern Hills LLA
4	Meikle Bin	266724	682176	4.2	Recreational users	Lowland River Valleys – Central LCT 152 Southern Hills LLA
5	Tomtain	272121	681402	4.1	Hill walkers	Rugged Moorland Hills LCT 216 Kilsyth Hills RSA
6	Denny Muir	275607	682270	4.7	Hill walkers	Lowland Hills – Central LCT 149 Denny Hill SLA
7	Tak Me Doon Road	273529	681532	4.5	Road users	Rugged Moorland Hills LCT 216 Denny Hill SLA
8	Carron Valley Reservoir Shore Trail	270994	683143	2.1	Recreational users	Rugged Moorland Hills LCT 216 Kilsyth Hills RSA
9	Carron Valley Reservoir Long Distance Path	267463	684511	1.8	Recreational users	Lowland River Valleys – Central LCT 152 Southern Hills LLA
10	Sir John de Graham's Castle	268140	685856	0.5	Visitors	Lowland Hills – Central LCT 149 Southern Hills LLA
11	B822 South East of Fintry	261989	686516	4.4	Road users	Lowland River Valleys LCT 152 Southern Hills LLA
12	Path below Ling Hill	267005	688768	0.4	Recreational users	Lowland Hills – Central LCT 149 Southern Hills LLA
13	Stirling Castle	278971	694035	9.8	Visitors	Urban LCT 0



ID	Viewpoint Name	Grid Ref (preliminary)		Distance to nearest proposed wind turbine (km)	Receptors Represented	Landscape Character / Landscape Designation
		Easting	Nothing			
14	Wallace Monument	280908	695659	12.3	Visitors	Lowland Valley Fringes LCT 154 Western Ochils LLA
15	Carron Valley Forestry Commission Car Park	272131	683865		Recreational users and visitors	Lowland River Valleys – Central LCT 152 Southern Hills LLA
16	Earl's Seat	256986	683800		Hill walkers	Lowland Hills - Central LCT 149 Southern Hills LLA

### 6.8.7 Potential Visual Effects of Wind Turbine Lighting

A key factor in the development of wind turbines greater than 150m in height is the likely requirement for them to have visible red, medium intensity (2,000 candela) lights fitted to the hubs, with low intensity lights on the towers, in accordance with Civil Aviation Authority (CAA) guidance. The details of the lighting requirements for the proposed development are currently being defined along with potential mitigation measures.

Should the proposed wind turbines remain above 150m to tip, a night-time visual impact assessment and visualisations illustrating wind turbine lighting at night will be prepared for inclusion in the LVIA. A hub height ZTV will be used to identify where there would be direct line of sight of the lights from the surrounding area.

In order to inform this assessment, photographs will be captured from four of the readily accessible viewpoints at dusk (photographs to be taken after the period of civil twilight) and visualisations will be prepared to represent the effects of lighting on these views. Night-time visualisations will be in accordance with NatureScot guidance. It is proposed that of the initially proposed viewpoints listed in **Table 6-1** that the following locations be used for night-time visualisations: Viewpoint 1 Minor road near Easter Cringate, Viewpoint 3 Easter Buckieburn, Viewpoint 13 Stirling Castle and Viewpoint 11 B822 South East of Fintry.

### 6.8.8 Potential Cumulative Effects

A review of the broad wind farm context has been undertaken and in combination with the ZTV analysis in Section 6.8.1 ZTV Overview, it is considered that any cumulative effects that would occur, would arise as a result of the pattern of development within the 20km CLVIA Study Area radius, rather than as a result of changes beyond this. It is therefore proposed that the cumulative assessment in the LVIA be focussed upon a 20km CLVIA Study Area. Following a detailed review of the cumulative sites within the area, a plan will be produced showing the locations of wind farms within 20km of the proposed wind turbines, that are operational, under construction, consented, or which are at application stage and where the wind turbines are greater than 50m to blade tip, and would therefore be included within any cumulative assessment for the proposed development. Exceptionally, scoping stage sites may also be included where they are considered to be of specific relevance to the



cumulative effect of the proposed development. Known cumulative wind farms within the 20km CLVIA Study Area are shown for scoping purposes on **Figure 13**. The final list of developments to be considered within the detailed cumulative assessment will be determined closer to the application submission date and will take account of consultation feedback from key consultees.

## 6.9 Conclusion

### Summary of Key Sensitivities / Potential Effects

- Potential effects on landscape character, including cumulative effects, particularly on the host landscape character of Lowland Hills - Central LCT 149;
- Potential effects on the Southern Hills LLA, Kilsyth Hills LLA and Denny Hills SLA;
- Potential cumulative effects with developments found within 20km of the proposed development;
- Potential visual effects from principal visual receptors within the local context of the Stirling Hills including from key routes and settlements;
- Visibility of the proposed development at night due to visible aviation lighting; and
- Residential Visual Amenity effects from properties within 2km of the proposed wind turbines.

Those receptors scoped in or out of the LVIA following initial desk-based review are listed below in **Table 6-3**. Further detail on the identified receptors is presented in **Table 6-1** and **Table 6-2**.

**Table 6-3: Receptors and Effects Scoped In or Out of Assessment**

Receptor / Effect	Scoped In	Scoped Out
Physical landscape effects	Physical landscape effects within the Site.	Physical landscape effects outside the Site.
Landscape Character	Landscape Character Types within 20km of the proposed development including cumulative effects.	LCT where they are located at a distance of greater than 20km from the proposed development.
Landscape Designations and Wild Land	Landscape Designations with potential for significant effects as described in the preliminary assessment in <b>Table 6-1</b> <sup>27</sup> .	All other landscape designations and WLAs.
Visual	Effects on representative viewpoints including cumulative visual effects. Effects on principal visual receptors within the 45km LVIA Study Area including settlements, key transport routes, hilltops and recreational routes. Visual effects of visible aviation wind turbine lighting. Residential visual amenity effects on properties within 2km of the proposed wind turbines.	Principal visual receptors with limited or no visibility.

<sup>27</sup> NOTE - the preliminary assessment presented in this report will be re-checked against the final design.





## 6.10 Consultation

On 19 July 2024, Stirling Council issued their initial Pre-Application Advice response with regards the proposed development. Landscape and visual comments were included in this response, including suggestions for additional viewpoint locations which will be considered ahead of agreeing viewpoints and the approach for the LVIA.

Including through the process of this EIA Scoping Request, further consultation will be undertaken with Stirling Council and NatureScot in relation to viewpoint agreement and LVIA approach.

## 6.11 Matters Scoped Out

As per **Table 6-3** above, the following receptors / effects, are proposed to be scoped out of the LVIA:

- Physical landscape effects outside the Site;
- LCT where they are located at a distance of greater than 20km from the proposed development;
- Landscape designations and WLAs with no potential for significant effects, as described in the preliminary assessment in **Table 6-1**; and
- Principal visual receptors with limited or no visibility.

## 6.12 Questions for Consultees

The following questions are directed to consultees:

- Q6.1: Do consultees have any comments on the proposed approach and methodology?
- Q6.2: Do consultees agree that the proposed LVIA, Detailed LVIA and CLVIA study areas are appropriate?
- Q6.3: Do consultees agree that the assessment of the effects on landscape character receptors (except landscape planning designations) should focus on areas within a 20km radius of the proposed wind turbines?
- Q6.4: Do consultees agree with the proposal to scope out the Landscape Planning Designations where no further assessment is proposed in the LVIA, as set out in **Table 6-1**?
- Q6.5: Do consultees have any comments or suggestions in relation to the Preliminary Representative Viewpoint Locations shown in **Table 6-2** and illustrated on **Figures 7** and **8**?
- Q6.6: Do consultees agree that the assessment of cumulative effects should focus on areas within a 20km radius of the proposed wind turbines?
- Q6.7: Do consultees have any further comments or suggestions on the approach to cumulative assessment?

## 6.13 References and Standard Guidance

Landscape Institute and Institute for Environmental Management and Assessment (2013) 'Guidelines for Landscape and Visual Impact Assessment: Third Edition' ('GLVIA3').

SNH and The Countryside Agency (TCA) (2002). Landscape Character Assessment Guidance for England and Scotland. Available at: <https://digital.nls.uk/pubs/e-monographs/2020/216649977.23.pdf> Accessed 19.06.2024





- SNH (2017) Visual Representation of Wind Farms Version 2.2. Available at: <https://www.nature.scot/sites/default/files/2019-09/Guidance%20-%20Visual%20representation%20of%20wind%20farms%20-%20Feb%202017.pdf>  
Accessed: 19.06.2024
- NatureScot (2021). Assessing the Cumulative Impact of Onshore Wind Energy Developments. Available at: <https://www.nature.scot/doc/guidance-assessing-cumulative-landscape-and-visual-impact-onshore-wind-energy-developments> Accessed: 19.06.2024
- Landscape Institute (2019). Visual Representation of Development Proposals: Landscape Institute Technical Guidance Note 06/19. Available at: [https://www.landscapeinstitute.org/wp-content/uploads/2019/09/LI\\_TGN-06-19\\_Visual\\_Representation-1.pdf](https://www.landscapeinstitute.org/wp-content/uploads/2019/09/LI_TGN-06-19_Visual_Representation-1.pdf) Accessed: 19.06.2024
- NatureScot (2020). Assessing Impacts on Wild Land Areas Technical Guidance. Available at: <https://www.nature.scot/doc/assessing-impacts-wild-land-areas-technical-guidance>  
Accessed: 19.06.2024
- SNH (2017). Descriptions of Wild Land Areas. Available at: <https://www.nature.scot/doc/wild-land-areas-map-and-descriptions-2014> Accessed: 19.06.2024
- SNH (2010). The special qualities of the National Scenic Areas. Scottish Natural Heritage Commissioned Report No. 374. Available at: <https://www.nature.scot/doc/naturescot-commissioned-report-374-special-qualities-national-scenic-areas> Accessed: 19.06.2024
- NatureScot (DRAFT 2018-2019 or as updated). Guidance for Assessing the Effects on Special Landscape Qualities. Available at: <https://www.nature.scot/professional-advice/protected-areas-and-species/protected-areas/national-designations/national-scenic-areas/nsa-special-qualities> Accessed: 19.06.2024
- Landscape Institute (2019). Technical Guidance Note 2/19 Residential Visual Amenity Assessment. Available at: <https://www.landscapeinstitute.org/technical-resource/rvaa/>  
Accessed: 19.06.2024
- SNH (2017). Siting and Designing of Windfarms in the Landscape: Version 3a. Available at: <https://www.nature.scot/doc/siting-and-designing-wind-farms-landscape-version-3a>  
Accessed: 19.06.2024
- Stirling Council Supplementary Guidance Wind Energy Development (2019). Available at: <https://www.stirling.gov.uk/planning-and-building/planning-and-building-standards-documents-a-z/wind-energy-developments-february-2019/> Accessed: 31.07.2024
- North Lanarkshire Council Landscape Capacity Study for Wind Turbine Development Background Report (2018). Available at: <https://www.northlanarkshire.gov.uk/planning-and-building/development-plans/plan-background-reports> Accessed: 31.07.2024
- Falkirk Council Spatial Framework and Guidance for Wind Energy Development Supplementary Guidance SG14 (2015). Available at: <https://www.falkirk.gov.uk/services/planning-building/planning-policy/supplementary-guidance/docs/supplementary-guidance/adopted-documents/14%20SG14%20Spatial%20Framework%20and%20Guidance%20for%20Wind%20Energy%20Development.pdf?v=201512071400> Accessed: 31.07.2024
- Civil Aviation Authority (2016) CAP 764: Policy and Guidelines on Wind Turbines. Available online from: <https://www.caa.co.uk/publication/download/14561> [Accessed on 31.07.2024].



## 7.0 Ecology

### 7.1 Introduction

SLR Consulting has been commissioned by EWE to undertake ecological surveys and impact assessment for the proposed development. The Site is characterised by broadleaved woodland, conifer plantation, bog and grassland and there are several watercourses within the Site boundary.

This section of the Scoping Report considers the scope of survey work required to assess potential significant effects associated with ecology (habitats and non-avian animal species), during the construction and operational phases of the proposed development.

### 7.2 Environmental Baseline and Potential Sources of Impact

The information provided in sections 7.2 to 7.4 summaries the desk study, to date, and field survey results obtained to date. Full baseline reports are available on request upon completion.

#### 7.2.1 Desk Study

##### 7.2.1.1 Designated Sites

There are 13 statutory designated sites within 10km of the Site, designated primarily for their non-avian ecological features, including 10 SSSIs and three SACs. These are detailed in **Table 7-1** (see **Figure 14** for Designated Sites).

**Table 7-1: Statutory Designated Sites within 10km**

Site Name	Designation	Distance (km) and direction from Site	Reasons for Designation
Endrick Water	SSSI and SAC	2.0 NE	Scottish dock <i>Rumex aquaticus</i> , river lamprey <i>Lampetra fluviatilis</i> , brook lamprey <i>Lampetra planeri</i> , and Atlantic salmon <i>Salmo salar</i> . Also of fluvial geomorphological interest.
	SAC		River lamprey, brook lamprey, and Atlantic salmon
Denny Muir	SSSI	3.9 W	Subalpine acid grassland, blanket bog, basic fen.
Double Craigs	SSSI	4.2 W	Subalpine calcareous grassland. Also of geological interest.
Carron Glen	SSSI	3.8 NW	Upland oak woodland, upland mixed ash woodland, lowland neutral grassland.
Sauchie Craig Wood	SSSI	5.9 NW	Upland mixed ash woodland. Also of geological interest.
Dullatur Marsh	SSSI	7.5 ENE	Hydromorphological mire range.
Sculliongour Limestone Quarry	SSSI	7.9 S	Lowland calcareous grassland.



Site Name	Designation	Distance (km) and direction from Site	Reasons for Designation
Balglass Corries	SSSI	8.7 SW	Blanket bog, upland assemblage. Also of geological interest.
Wester Balgair Meadow	SSSI	9.5 SW	Lowland dry heath, lowland wet heath, valley fen, lowland neutral grassland.
Shirgarton Moss	SSSI	9.8 E	Raised bog.
Flanders Moss	SAC	9.9 E	Active raised bog, degraded raised bog.

### 7.2.1.2 Non-Statutory Designated Sites

Five non-statutory designated sites were found to be within 2km of the Site. Details of these sites can be found in **Table 7-2** below.

**Table 7-2: Non-Statutory Designated Sites Within 2km**

Site Name & Designation	Approximate Distance and Direction from Site (km)	Qualifying Feature(s) of Interest
Carron Valley LNCS	0 SE (borders the Site)	Forestry.
Carron Valley Reservoir and Forest LNCS	0.4 SE	Scenic trout fishery. Forestry.
Carron Forest LNCS	1.1 SE	Forestry.
Upper Endrick Water LNCS	1.6 W	Inland waterbodies, deciduous woodland, bog and marsh habitats.
River Carron (Bentend) and Faughlin Reservoir LNCS	2.6 SE	Reservoir and river habitat. Atlantic salmon.



### 7.2.1.3 Carbon and Peatland Map

According to the Carbon and Peatland Map (Scotland Soils, 2023), the majority of the Site consists of 'Class 5' peatland which suggests that there are areas where no peatland is present and 'Class 4' peatland suggesting there is heath with some peatland present. 'Class 3' soil is present only on Cairnoch Hill, which suggests peatland with some heath is present within the area. No priority peatland habitat is found within the Site boundary, but 'Class 3' is heavily associated with wet and acidic ground.

### 7.2.1.4 Ancient Woodland

A search of the Ancient Woodland Inventory (NatureScot 2020) returned one area of ancient woodland (ID: 9871i) within 2km of the Site which is a long-established (of plantation origin) woodland located south east of the Site boundary along the Carron Valley reservoir (Grid reference: NS 708839).

### 7.2.1.5 Protected and Otherwise Notable Species

Existing records of protected (International and National) and notable (Listed on Local Biodiversity Action Plans (LBAP)) species from within 2km (10km for bats), were collected from The Wildlife Information Centre (TWIC) as part of the desk study.

We consider that the data available from TWIC provides an adequate overview of the species present in the wider area. Additionally, all nearby windfarms will be reviewed for their relevance to ecology, and included in the desk study.

A total of seven bat species, eight mammal species, 10 invertebrate species, one lichen species, eight moss species and one fish species, have been recorded within 2km of the Site boundary (within 10km for bats). A number of these are protected species, and some were recorded within the Site boundary.

### 7.2.1.6 Other Species Records

The results of the 2023 Deer Distribution Survey (The British Deer Society) indicate the presence of the following species in the area surrounding the Site:

- Fallow deer *Dama dama* (recorded in 2016 and 2023);
- Roe deer *Capreolus capreolus* (recorded in 2016, 2007, 2011 and 2023);
- Red deer *Cervus elaphus* (recorded in 2016, 2007, 2011 and 2023); and
- Sika deer *Cervus nippon* (recorded in 2016, 2007, 2011 and 2023).

## 7.2.2 Potential Sources of Impacts

### 7.2.2.1 Construction

During construction of the proposed development, in the absence of mitigation, it is anticipated that impacts may arise from:

- Habitat loss or damage (permanent and temporary), or fragmentation due to construction of wind farm infrastructure, including drainage impacts to bog habitats;
- Possible changes to groundwater flows affecting groundwater dependent terrestrial ecosystems (GWDTEs);
- Inadvertent killing or injuring of fauna during construction;
- Disturbance to fauna due to vehicular traffic, plant and the presence of construction workers; and



- Sedimentation or other pollution of watercourses from construction activities and vehicular traffic.

### 7.2.2.2 Operation

During operation of the proposed development, in the absence of mitigation, it is anticipated that impacts may arise from:

- Vehicular traffic causing disturbance, injury or death to fauna;
- Environmental incidents and accidents (e.g. spillages); and
- Moving turbine blades leading to mortality due to collision or barotrauma (bats only).

## 7.3 Method of Assessment and Reporting

### 7.3.1 Desk Study

The desk study provides historic background data on the species and ecological sensitivities of the Site and surrounding area that can be used both to inform the details of survey methodology and EIA.

The desk study was undertaken in 2024. Desk study data was obtained from those data sources considered to provide the highest quality and most relevant data, including SNH SiteLink, The Wildlife Information Centre (Lothian and Borders), and readily accessible environmental documentation for nearby developments.

Study area:

- Protected species data and non-statutory designated sites: within 2km of the turbine envelope<sup>28</sup> (all available years);
- Bat data: within 10km of the turbine envelope (all available years);
- Statutory designated sites: within 5km of the turbine envelope (10km to allow for identification of sites with bat interests); and
- Ancient woodland: within 2km of the turbine envelope.

All nearby windfarms, as detailed in Section 2.3, will be reviewed for relevant ecological data.

All field surveys and desk based assessments will be undertaken in 2024.

### 7.3.2 Field Surveys

The following field surveys have commenced and will be completed in summer 2024:

- UK Habitat Classification (UKHab) and National Vegetation Classification (NVC) Survey (See **Figures 15a-i** and **16a-i**);
- Protected Mammals Survey;
- Habitat suitability Index Survey and eDNA survey for Great Crested Newt (GCN);
- Bat activity survey; and
- Fish Habitat Assessment.

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<sup>28</sup> The turbine envelope is defined as a line drawn between the outermost proposed turbine locations.



Consideration of whether potentially suitable habitat for other protected species is present and could be affected (e.g. reptiles) will be undertaken in conjunction with mammal surveys.

The fish habitat assessment has been completed and identified electrofishing surveys to be required.

Further details regarding each survey are provided in Section 7.3.3 . The results of each survey will be reported in full within baseline survey reports, which will be Technical Appendices to the EIA Report.

### **7.3.3 Field Survey Methodology**

#### **7.3.3.1 UKHab Survey and NVC Methodology**

The habitat surveys have commenced and will be undertaken within the Site boundary, plus, where accessible, a 250m buffer of the Site boundary. Historically this level of habitat survey has been undertaken following Phase 1 methodology. Phase 1 survey is now being replaced with a more modern survey method, UKHab, which is better for identifying priority habitats. UKHab surveys were completed to a minimum detail of Level 4.

NVC surveys were undertaken in conjunction with UKHab surveys and mapped in detail potentially important semi-natural vegetation communities onsite to allow identification of potential GWDTE and Annex 1 habitats. Methods followed NVC users handbook (Rodwell, J, S 2006) and will focus on potentially important natural/semi-natural habitats only i.e., excluding improved grassland and any other artificial habitats.

##### **7.3.3.1.1 Protected Mammals Survey**

A combined protected mammals walkover survey was partially undertaken to look for signs of otter, water vole, pine marten and any other protected or notable mammal species. The survey was carried out using standard methodologies e.g.: (Dean M., Strachan, R., Gow, D. and Andrews, R., 2016), (Harris, S, Cresswell, P and Jeffries, D, 1989), (Lenton, EJ, Chanin, PRF and Jeffries, DJ, 1980), (Strachan R , 2002). Notes were taken on other ecologically notable features encountered.

However, the initial survey was aborted due to unsuitable weather conditions and will therefore continue during summer 2024.

The survey area will include: the Site boundary, layout adjustment zone (without a buffer to the north and west due to access limitations at the time of survey) and a 100m buffer to the east and south (extended to 250m along watercourses to allow for identification of otter resting sites within disturbance distance of proposed working areas), access permitting.

##### **7.3.3.2 Bat Roost Survey**

This survey aims to identify any potential bat roosts and habitats suitable for roosting, foraging and commuting bats, particularly those close to proposed turbine locations, to inform EIA and further survey requirements. Bat roosts were considered unlikely at this Site, due to the lack of woodland or other structures such as buildings, bridges or cliffs/caves.

Bat foraging habitat and potential roost features were recorded during the protected mammals walkover survey.

Following NatureScot guidance (NatureScot, 2021), the surveys were focused on potential bat roosts that could support maternity roosts and significant hibernation and/or swarming sites within 200m + rotor radius of turbines. However, to allow for changes in Site layout any potential roosts within the mammal survey area were recorded.



### 7.3.3.3 Bat Activity Survey

Bat activity surveys are being undertaken to identify the level of bat activity at key locations within the Site to inform impact assessment.

Surveys followed current guidance (NatureScot, 2021), which specifies the use of full spectrum rather than zero-crossing static bat detectors. Full spectrum SM4 static detectors were used for the collection of acoustic bat activity data.

The detectors are being deployed with the aim of providing at least the minimum 10 nights of data recorded in suitable weather conditions each season, spring (April-May), summer (June-mid-August) and autumn (mid-August-October), weather permitting. Detectors are being deployed for a minimum of 14 nights per season to maximise the chances of obtaining 10 nights of suitable data. NatureScot guidance requires one detector per turbine for the first 10 turbines and then one detector per three turbines for sites with more than 10 turbines. For this Site the exact turbine number and locations were not known, we therefore deployed eight static detectors per season to achieve full habitat coverage required over an indicative option area.

The eight detectors are placed close to likely turbine locations to cover the full range of habitat in which turbines are likely to be positioned, with another two placed slightly further from indicative turbine locations (up to approximately 200m) within the Site (at the time of survey) to give a full picture of bat activity in different habitat types.

Data will be analysed using Kaleidoscope Pro software with manual checking by an experienced bat ecologist. In addition, analysis of data against data for other sites was undertaken, using the online Ecobat tool (if available), as recommended by current NatureScot et al. guidelines. The data can also be made available on request upon completion.

Weather data will be obtained from an onsite weather station.

### 7.3.3.4 Great Crested Newt eDNA and Habitat Suitability Index Assessment

The Site lies within a known range for GCN. Ponds on Site and/or within 500m of proposed infrastructure (including access tracks) will be subject to a Habitat Suitability Index (HSI) assessment and eDNA analysis.

These surveys have commenced and followed the ARG Advice Note (2010) for HSI and eDNA survey of all waterbodies suitable to support newts, within the Site and up to 500m of the Site boundary, were carried out in line with the recommended guidelines (*Langton et al.*, 2001).

Samples were taken following the instructions provided with the ADAS sample kits (a company specialising in environmental sampling analysis). From each waterbody, 20 water samples were taken at equidistant intervals (where possible) around the circumference of the outer edge. The 20 samples were then mixed, and six individual samples per pond were taken and sent to ADAS laboratory for eDNA analysis.

### 7.3.3.5 Fish Habitat Surveys

A fish habitat assessment has been undertaken in accordance with standard guidelines. Results of the assessment have highlighted the need for further species specific surveys, including salmonid, eels, freshwater pearl mussel and other protected / BAP species.

### 7.3.3.6 Electrofishing Surveys

The Endrick Water SSSI has relevance to brook and river lamprey and the Endrick Water SAC with specific interest in Atlantic salmon. Electrofishing surveys have taken place in order to inform the assessment of the impacts on these designated sites.





Electrofishing will help assess potential impacts from the proposed development, as well as identify opportunities and constraints whilst determining appropriate avoidance, mitigation and enhancement measures. Furthermore, Marine Science Scotland (MSS) advise electrofishing is undertaken to inform wind farm planning applications, particularly where there is connectivity to statutory designated sites. Results of the electrofishing assessment will be used to advise on further electrofishing requirements e.g., construction phase monitoring.

### **7.3.4 Ecological Impact Assessment**

The ecological impact assessment would be based on current Chartered Institute of Ecological and Environmental Management (CIEEM, 2018) guidance and would draw on other, more specific guidance as appropriate.

The impact assessment process would involve the following steps:

- Identifying important ecological features, i.e. features of sufficient value and/ or features subject to legal protection, for which detailed assessment is necessary;
- Identifying and characterising potential impacts on important features;
- Assessment of the significance of effects would be based on the assumption that standard mitigation measures, in line with standard wind farm construction good practice, would be embedded as part of the scheme;
- Incorporating additional measures to avoid and mitigate (reduce) potentially significant effects (if required);
- Assessing the significance of any residual effects after mitigation;
- Identifying appropriate compensation measures to offset significant residual effects (if required);
- Identifying opportunities for ecological enhancement; and
- Cumulative impact assessment along with other wind farm developments (operational and planned).

#### **7.3.4.1 Cumulative Effects**

The potential for cumulative impacts with other wind farm proposals would be assessed, as detailed in section 2.3. For (non-avian) ecological receptors potential cumulative impacts are only likely to be significant for other developments within the same hydrological catchments or located within the regular range of more mobile species, e.g. bats. As such the cumulative assessment would be restricted to other wind farms within the same hydrological catchment and/or other wind farms within approximately 10km.

## **7.4 Consultation**

To date there has been no consultation with statutory and non-statutory bodies in relation to Ecology and the proposed development (the Stirling Council pre-application advice did not provide any detail on ornithology matters). However, consultation will be undertaken prior to submission of the EIA Report with relevant statutory and non-statutory consultees.



## 7.5 Matters Scoped Out

### 7.5.1 Deer

Wild deer are not considered to be present in significant numbers and therefore impacts on deer have been scoped out of assessment. A draft Deer Management Statement is not considered to be required.

## 7.6 Approach to Mitigation

Mitigation, compensation and enhancements would be developed in consultation with key stakeholders, drawing on evidence from other schemes as appropriate. Mitigation is likely to take the form of design mitigation, construction mitigation and habitat restoration / management during wind farm operation. Design mitigation, where possible, would be incorporated by the involvement of the lead ecologist in the scheme design process. This may involve, for example, the avoidance of areas of high-quality bog habitat or instigation of buffer zones around GWDTEs etc. Construction mitigation may involve restrictions on the timing of construction work in certain areas and the use of an Ecological Clerk of Works (ECoW). Compensation and enhancement during wind farm operation is expected to be secured through the development and agreement of a Habitat Management Plan (HMP). Post-construction monitoring would be proposed only where necessary, i.e. surveys which are essential to measure specific impacts or to assess the success of proposed habitat management.

## 7.7 Questions for Consultees

The following questions are directed to consultees:

- Q7.1: Does NatureScot confirm they are happy with the approaches detailed in this Scoping Report, including the matters proposed to be scoped out of further assessment?
- Q7.2: No access will be gained outside of Site to the north, north east and north west, partial access to the west, of the red line boundary to carry out surveys within the associated survey buffers for habitats (GWDTE's) and protected species. Can NatureScot / SEPA confirm that they are happy that these areas would not be surveyed?

## 7.8 References and Standard Guidance

<https://ecountability.co.uk/ukhabworkinggroup-ukhab/>

Rodwell, JS, 2006. National Vegetation Classification: Users' Handbook. JNCC, Peterborough.

Amphibian and Reptile Group (2010). Advice Note 5: Great Crested Newt Habitat Suitability Index.

Biggs, J. et al. (2014). Analytical and methodological development for improved surveillance of the Great Crested Newt. Appendix 5. Technical advice note for field and laboratory sampling of great crested newt (*Triturus cristatus*) environmental DNA. Freshwater Habitats Trust, Oxford

Buddendorf, W. B., Jackson, F. L., Malcolm, I. A., Millidine, K. J., Geris, J., Wilkinson, M. E., & Soulsby, C. (2019). Integration of juvenile habitat quality and river connectivity models to understand and prioritise the management of barriers for Atlantic salmon populations across spatial scales. *Science of the Total Environment*, 655, 557-566. CIEEM (2018) Guidelines for



Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Chartered Institute of Ecology and Environmental Management, Winchester.

CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine version 1.2. Chartered Institute of Ecology and Environmental Management, Winchester.

Dean M., Strachan, R., Gow, D. and Andrews, R. (2016). The water vole mitigation handbook (The Mammal Society Mitigation Guidance Series). Eds Fiona Mathews and Paul Chanin. The Mammal Society London.

The British Deer Society (n.d.). Deer Distribution Survey. [online] The British Deer Society. Available at: <https://bds.org.uk/science-research/deer-surveys/deer-distribution-survey/> [Accessed 20 Dec. 2023].

Gurnell, J., Lurz, P., McDonald, R., Pepper, H. (2009). Practical Techniques for Surveying and Monitoring Squirrels. Forestry Commission Scotland, Edinburgh.

Harris, S, Cresswell, P and Jeffries, D. (1989). Surveying Badgers (Volume 9, Occasional Publication). Mammal Society.

Hendry, K. & Cragg-Hine, D. (1997). Restoration of Riverine salmon habitats. Fisheries Technical Manual 4, Environment Agency, Bristol.

JNCC. (2010). Handbook for Phase 1 habitat survey - a technique for environmental audit: Revised Re-print. JNCC, Peterborough.

Lenton, EJ, Chanin, PRF and Jeffries, DJ. (1980). Otter Survey of England 1977-1979. Nature Conservancy Council, London.

LUC (2013). Craigton and Spittalhill Wind Farm Environmental Statement. [http://www.force9energy.co/projects/current/craigtonspittalhill/CraigtonSpittalhill\\_%20ES\\_Volume%20I\\_Text.pdf](http://www.force9energy.co/projects/current/craigtonspittalhill/CraigtonSpittalhill_%20ES_Volume%20I_Text.pdf).

LUC (2020). Shelloch Wind Farm EIA Report. [https://pabs.stirling.gov.uk/online-applications/files/6845BF4035DDC6F853329A1C78DBA207/pdf/20\\_00840\\_FUL-CHAPTER\\_8\\_\\_ECOLOGY-792923.pdf](https://pabs.stirling.gov.uk/online-applications/files/6845BF4035DDC6F853329A1C78DBA207/pdf/20_00840_FUL-CHAPTER_8__ECOLOGY-792923.pdf).

NatureScot. (2020). General pre-application and scoping advice for onshore wind farms: General pre-application and scoping advice for onshore wind farms | NatureScot

NatureScot (n.d.). Ancient Woodland Inventory. [online] [opendata.nature.scot](https://opendata.nature.scot). Available at: <https://opendata.nature.scot/datasets/ancient-woodland-inventory/explore> [Accessed July. 2023].

Rodwell J.S (Editor) (1991 et seq.) British Plant Communities. Cambridge University Press

Rodwell, J.S, (2006), NVC Users' Handbook, 68 pages, ISBN 978 1 86107 574 1. Scottish Government (2013) Scottish Government Scottish Biodiversity List SBL [online] Available at: <http://www.gov.scot/Topics/Environment/Wildlife-Habitats/16118/Biodiversitylist/SBL> [Accessed in September 2021].

Scotland's Soils Part of Scotland's Environment. [Online] Scotland's Soils - soil maps (environment.gov.scot). Available at: Carbon and Peatland Map 2016 [https://map.environment.gov.scot/Soil\\_maps/?layer=10](https://map.environment.gov.scot/Soil_maps/?layer=10) [Accessed July 2024]

Scottish Fisheries Co-ordination Centre (SFCC) (2007) Introductory electrofishing training manual & electrofishing team leader training manual. Available at: <http://www.sfcc.co.uk/resources/electrofishing.html> [Accessed in July 2021].

SEPA (2017). Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems. Land Use



Planning System SEPA Guidance Note 31 (LUPS – GN31). Version 3 Issued 11 September 2017.

SEPA. (2017). Land Use Planning System SEPA Guidance Note 31 Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems. Version 3.

SKM (2006). Craigengelt Wind Farm, Stirling: Environmental Statement.  
[https://pabs.stirling.gov.uk/online-applications/files/54D8359D58544282E438F0EEEB7F28C3/pdf/06\\_01052\\_DET--281135.pdf](https://pabs.stirling.gov.uk/online-applications/files/54D8359D58544282E438F0EEEB7F28C3/pdf/06_01052_DET--281135.pdf), pp.179–200.

SNH (2018) SNH general pre-application/ scoping advice to developers of onshore wind farms. Available at: <http://www.snh.gov.uk/docs/A1150291.pdf> [Accessed in September 2021].

SNH (2019) Good Practice during Wind Farm Construction, 4th Edition. Available at: <https://www.nature.scot/guidance-good-practice-during-wind-farm-construction> [Accessed in September 2021].

SNH, Natural England, Natural Resources Wales, RenewableUK, Scottish Power Renewables, Ecotricity Ltd, University of Exeter and the Bat Conservation Trust (BCT) (2019) Bats and onshore wind turbines: survey, assessment and mitigation.

SNH. (2019). Bats and onshore wind turbines - survey, assessment and mitigation.

Strachan R. (2002). Mammal detective. Whittet Books Ltd.

The Scottish Government (2023) National Electrofishing Programme for Scotland (NEPS) 2021: Analysis, Scottish Government. Available at: <https://www.gov.scot/publications/national-electrofishing-programme-scotland-neps-2021/pages/3/> (Accessed: 18 April 2024).

Velander, K. A. (1983) Pine Marten Survey of Scotland, England and Wales 1982 – 1983. The Vincent Wildlife Trust, London.



## 8.0 Ornithology

### 8.1 Introduction

This Section sets out the approach to the evaluation of the ornithology interests utilising the proposed development Site and surrounding area, and to the assessment of potential impacts on birds throughout the construction and operation phases of the proposed development.

This section has been authored by APEM, who will manage the ornithological aspects of the EIA. Baseline ornithology surveys and a preliminary desk-based study were undertaken by Environmental Resources Management (ERM).

### 8.2 Environmental Baseline and Potential Sources of Impact

#### 8.2.1 Desk-Based Study Methods

A desk-based study was undertaken to inform the scope of the baseline ornithology surveys, including a search for any designated sites with ornithological features with potential connectivity to the proposed development.

To gather records of historic breeding or roosting (within the last ten years) raptor species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended)<sup>29</sup> and / or Annex I of the Birds Directive<sup>30</sup>, The Central Raptor Study Group (CRSG) was contacted in March 2022. An updated desk-based study will be undertaken to inform the Ecology Impact Assessment (EclA), including requests for relevant ornithological records from the CRSG, Royal Society for the Protection of Birds and any other relevant organisations.

#### 8.2.2 Desk-Based Study Results

##### 8.2.2.1 Statutory Sites Designated for Ornithological Features

The NatureScot (NS) SiteLink online tool<sup>31</sup> was used to search for statutory sites designated for ornithological features within the following search areas from the proposed development Site boundary:

- 20km for statutory sites designated for wintering geese; and
- 10km for statutory sites designated for other ornithological features.

No statutory sites designated for ornithological features were identified within 10km of the Site boundary. However, two statutory sites with multiple designations for wintering geese were identified within 20km: Slamannan Plateau Special Protection Area (SPA)<sup>32</sup> and Site of Special Scientific Interest (SSSI)<sup>33</sup>; and Firth of Forth Ramsar site<sup>34</sup>, SPA<sup>35</sup> and SSSI<sup>36</sup>.

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<sup>29</sup> Wildlife and Countryside Act (1981) as amended. Available at: <http://www.legislation.gov.uk/ukpga/1981/69> (accessed June 2024).

<sup>30</sup> The Birds Directive (2009/147/EC). Available at: [https://ec.europa.eu/environment/nature/legislation/birdsdirective/index\\_en.htm](https://ec.europa.eu/environment/nature/legislation/birdsdirective/index_en.htm) (accessed June 2024).

<sup>31</sup> NatureScot SiteLink. (Available at: <https://sitelink.nature.scot/home> (accessed June 2024).

<sup>32</sup> Slamannan Plateau SPA. Available at: <https://sitelink.nature.scot/site/9184> (accessed June 2024).

<sup>33</sup> Slamannan Plateau SSSI. Available at: <https://sitelink.nature.scot/site/9171> (accessed June 2024).

<sup>34</sup> Firth of Forth Ramsar site. Available at: <https://sitelink.nature.scot/site/8424> (accessed June 2024).

<sup>35</sup> Firth of Forth SPA. Available at: <https://sitelink.nature.scot/site/8499> (accessed June 2024).

<sup>36</sup> Firth of Forth SSSI. Available at: <https://sitelink.nature.scot/site/8163> (accessed June 2024).



Slamannan Plateau SPA and SSSI are located approximately 12.7km south east of the Site (at the closest point), and both designations are for wintering taiga bean goose (*Anser fabalis*).

The Firth of Forth Ramsar site, SPA and SSSI are located approximately 14.6km north east of the Site (at the closest point), and the designations are for wintering pink-footed goose (*Anser brachyrhynchus*), in addition to an assemblage of other wintering waterfowl.

### 8.2.2.2 Central Raptor Study Group Data

The CRSG provided details of a single protected raptor species confirmed to be breeding within the search area, as well as records of two additional protected raptor species that were possibly breeding within the search area; details for all three species are provided in the Confidential **Appendix 04**.

The CRSG also provided a record of a single female hen harrier circling over woodland on the 23/04/2009. The CRSG had no further records of hen harrier within 2km of the Site, and there was no evidence that hen harrier has bred or roosted within 2km of the Site within the last ten years.

### 8.2.3 Ornithology Baseline Survey Methods

Initial ornithological surveys of the Site and surrounding area commenced in September 2021 and were concluded in August 2023. The survey programme implemented, and methodologies used are summarised below. The baseline ornithology Survey Areas are shown on **Figure 17**. It should be noted that Survey Areas were based on a Site boundary at the time of survey which was slightly larger than the current Site boundary.

Goose foraging surveys were scoped out prior to commencement of the ornithology baseline surveys due to data from Mitchell (2012), which showed the proposed development Site does not fall within the known foraging areas of pink-footed geese from the Firth of Forth SPA / SSSI / Ramsar (or any other designated sites). Similarly, taiga bean goose, an extremely localised species in Scotland, is known to forage very close to the Slamannan Plateau SPA and SSSI (Thorton *et al.*, 2021).

#### 8.2.3.1 Flight Activity Surveys

Flight Activity Surveys (FAS) from three Vantage Point (VP) locations (See **Figure 18**) were undertaken between September 2021 and August 2023 to determine flight activity of 'target species' within the Site and a 500m buffer in accordance with guidance (NatureScot, 2017). Target species recorded during surveys included the following:

- All wild swan, goose and duck species (except Canada goose and mallard);
- All Schedule 129 and Annex 130 raptor and owl species;
- All wader species;
- Black grouse; and
- Nightjar.

The flight lines of all target species observed during the FAS were recorded on large scale maps in the field and categorised into the following height bands:

- 1 <10m
- 2 10-20m
- 3 21-150m; and
- 4 >150m.



A total of 72 hours of surveys per VP were completed each year, with survey effort split equally between breeding (April to August) and non-breeding seasons (September to March).

Surveys were spread through the year, with six hours of survey per VP completed in most months as shown in **Table 8-1**.

**Table 8-1: Monthly Breakdown of Hours per VP over the two years of Flight Activity Surveys**

Month	Hours of Survey		
	VP1	VP2	VP3
<b>Year 1 (September 2021 to August 2022)</b>			
September	6	6	0
October	6	6	12
November	6	6	3
December	6	6	9
January	6	6	6
February	6	6	6
March	6	6	6
April	6	6	6
May	6	6	6
June	6	6	6
July	6	6	6
August	6	6	6
<b>Year 2 (September 2022 to August 2023)</b>			
September	6	6	6
October	6	6	6
November	6	6	6
December	6	6	6
January	6	6	6
February	6	6	6
March	6	6	6
April	6	6	6
May	6	6	6
June	6	6	6
July	6	6	6
August	6	6	6





### 8.2.3.2 Black Grouse Surveys

Black Grouse Surveys were completed based on the method detailed in Gilbert *et al.*, (1998) during the 2022 and 2023 breeding seasons. The survey area covered all potentially suitable lekking habitat within the Site and a surrounding 1.5km buffer (access permitting) in line with NatureScot (2017) guidance.

### 8.2.3.3 Breeding Raptor Surveys

Breeding Raptor Surveys of the Site and surrounding 2km buffer followed survey methods described in Hardey et al. (2013). In accordance with guidance (NatureScot, 2017), monthly survey visits were conducted between mid-March and early August, for both 2022 and 2023. Target species were defined as Schedule 1 or Annex I raptor species, with other breeding raptors recorded as secondary species.

### 8.2.3.4 Moorland Breeding Bird Surveys

Moorland Breeding Bird Surveys (MBBS) of the Site and a surrounding 500m buffer were undertaken between early May and late July during 2022 and early May and late June 2023 to record breeding waders and other non-passerine species of conservation concern. In line with NatureScot guidance (NatureScot, 2017), the surveys followed an adapted Brown and Shepherd (1993) method (designed to census upland breeding waders), with four survey visits completed during each breeding season.

## 8.2.4 Ornithology Baseline Survey Results

A total of 346 flights by 18 target species were recorded during FAS. A summary of target species flights is provided in **Table 8-2** below. This includes flights of species discussed within the Confidential **Appendix 04**.

**Table 8-2: Number of Target Species Flights Recorded During Flight Activity Surveys**

Species	Number of Flights				Total	No. of birds per flight
	Year 1 Non-breeding Season	Year 2 Breeding Season	Year 2 Non-breeding Season	Year 2 Breeding Season		
Greylag goose	4	56	9	14	<b>83</b>	1-30
Pink-footed goose	6	0	3	0	<b>9</b>	12-75
Teal	0	0	4	0	<b>4</b>	1-6
Pochard	0	0	1	0	<b>1</b>	4
Tufted duck	0	0	3	0	<b>3</b>	1-5
Mute swan	0	1	0	0	<b>1</b>	2
Goldeneye	0	3	7	2	<b>12</b>	1-3
Goosander	0	1	1	0	<b>2</b>	2
Great crested grebe	0	3	0	0	<b>3</b>	1
Oystercatcher	0	1	0	0	<b>1</b>	1
Curlew	0	14	0	2	<b>16</b>	1-15
Osprey	0	110	0	75	<b>185</b>	1-4
Goshawk	2	4	1	0	<b>7</b>	1



Species	Number of Flights					No. of birds per flight
	Year 1 Non-breeding Season	Year 2 Breeding Season	Year 2 Non-breeding Season	Year 2 Breeding Season	Total	
Hen harrier	1	0	0	0	1	1
Marsh harrier	0	0	0	1	1	1
Red kite	0	5	7	0	12	1-2
Merlin	0	0	0	1	1	1
Peregrine	0	3	0	1	4	1
<b>TOTAL</b>	<b>13</b>	<b>201</b>	<b>36</b>	<b>96</b>	<b>346</b>	<b>N/A</b>

A summary of baseline survey results for each key species is provided below, with breeding wader territories shown in **Figure 19**. Details of four confidential breeding raptor species are provided separately within the Confidential **Appendix 04**. Black grouse were not recorded during any surveys, and therefore, this species has not been considered further.

- **Greylag Goose (*Anser anser*):** A total of 83 flights were recorded during the FAS, generally in small numbers, with the maximum flock size of 30 birds. However, a large flock of 145 birds was recorded on the Carron Valley reservoir in June 2023. This species was recorded during the 2022 MBBS and may have bred within the MBBS Survey Area. It is considered that these records are likely feral birds, rather than migratory Icelandic greylag geese;
- **Pink-footed Goose (*Anser brachyrhynchus*):** A total of nine flights were recorded during the FAS, in flocks ranging in size from 12 to 75 birds. All flights for this species were recorded early in the non-breeding season, predominately during September. It is likely these flights relate to birds on passage south to wintering grounds;
- **Mute Swan (*Cygnus olor*):** A single flight was recorded in April 2022 during FAS, consisting of two birds. Additionally, there were incidental records of this species outside of VP viewsheds;
- **Teal (*Anas crecca*):** Four flights were recorded early during the non-breeding season of the second year of FAS. Birds were recorded in small numbers, between one and six individuals. There was also an incidental recording of teal within a mixed flock of ducks on Carron Valley Reservoir in December 2022;
- **Pochard (*Aythya ferina*):** A group of four pochard was recorded flying over Carron Valley Reservoir during FAS in October 2022;
- **Tufted Duck (*Aythya fuligula*):** Three flights were recorded during the early non-breeding season of the second year of FAS. Birds were recorded in small numbers, between one and five individuals;
- **Goldeneye (*Bucephala clangula*):** A total of 12 flights were recorded during FAS, with the majority of these occurring in the non-breeding season. Goldeneye were also recorded incidentally on two occasions on Carron Valley Reservoir in December 2022 and January 2023;
- **Goosander (*Mergus merganser*):** A male and female were recorded transiting through the survey area in May 2022 and February 2023;
- **Great Crested Grebe (*Podiceps cristatus*):** Three flights were recorded within the first year of FAS, each flight consisted of a single individual;



- **Oystercatcher (*Haematopus ostralegus*):** Two oystercatcher territories were identified within the 2022 MBBS. Both territories were outwith the Site boundary but within the south-east of the MBBS Survey Area. In contrast, no oystercatcher territories were identified within the 2023 MBBS. Flight activity of this species was low, with just two recorded flights, one during FAS and the other during MBBS;
- **Lapwing (*Vanellus vanellus*):** During the 2022 MBBS, three territories were identified within the south-east of the MBBS Survey Area, one on the northern slopes of Craigannet Hill, and two to the south. Although observed during the 2023 MBBS, no evidence of breeding behaviour was recorded;
- **Curlew (*Numenius arquata*):** A total of 11 territories were recorded during MBBS; six in 2022 and five in 2023. All territories were outwith the Site boundary but within the MBBS. The majority of the territories were recorded in the south-east, with a smaller number of territories recorded to the north of the Site. Sixteen curlew flights were also recorded during FAS, all during the breeding season;
- **Snipe (*Gallinago gallinago*):** Eight territories were identified within the north and east of the MBBS Survey Area in 2022.. However, just a single territory was identified in 2023, located in the east of the Survey Area;
- **Common Sandpiper (*Actitis hypoleucos*):** In 2022, two possible common sandpiper territories were identified in the south-east of the MBBS Area, along the banks of the Carron Valley Reservoir. No territories were identified in 2023;
- **Redshank (*Tringa totanus*):** In 2022, a single possible redshank territory was recorded within the south-east of the MBBS Area, to the south of Craigannet Hill. No territories were identified in 2023;
- **Marsh Harrier (*Circus aeruginosus*):** A single flight was recorded during August 2023 FAS consisting of a juvenile bird;
- **Hen Harrier (*Circus cyaneus*):** A single male hen harrier was recorded during the 2022 Breeding Raptor Surveys. However, there was no evidence that hen harrier attempted to breed or establish a territory within the Breeding Raptor Survey Area in either 2022 or 2023;
- **Merlin (*Falco columbarius*):** A single merlin was observed hunting during a FAS in March 2023. There was no evidence that merlin attempted to establish a territory or breed during either the 2022 or 2023 breeding season; and
- **Crossbill (*Loxia curvirostra*):** Crossbill were occasionally observed within the north and south-east of the MBBS Survey Area during 2022. A possible territory was present within woodland in the north of the Survey Area, where calling crossbill were recorded during May and July 2022. The MBBS method was not designed to record breeding crossbill and it is likely that additional breeding territories are present within the plantation within the proposed development area.

## 8.2.5 Potential Impact Pathways

Target species may be impacted by the proposed development through the following pathways:

- Permanent or temporary loss of breeding, roosting and / or foraging habitat during construction;
- Collision risk with wind turbines during operation;
- Barriers to movement during operation; and



- Disturbance and displacement of breeding or foraging birds during all phases of the proposed development.

### 8.3 Method of Assessment and Reporting

Detailed below is the proposed methodology for undertaking the ornithological impact assessment within the EclA.

#### 8.3.1 Assessment Methods

The ornithological impact assessment will be conducted in accordance with the current guidance produced by the Chartered Institute of Ecology and Environmental Management (CIEEM; CIEEM, 2018).

The ornithology baseline and results of the ornithological impact assessment will be detailed in the Ornithology Chapter of the EIA Report. As recommended by CIEEM, this will include the following information:

- Collation of baseline ornithological information obtained through desk-based research, baseline field surveys and consultation to identify Important Ornithological Features;
- Identification and characterisation of potential ornithological impacts, including collision, disturbance and displacement from all phases of the proposed development;
- A comprehensive assessment of the potential impacts during the different phases of the proposed development on important ornithological features, and considering any embedded mitigation;
- Incorporation of mitigation measures to reduce identified impacts;
- Assessment of significance of residual impacts following mitigation;
- Identification of suitable compensation to offset any significant residual impacts; and
- Identify further opportunities for ornithological enhancement.

Potential cumulative impacts on ornithological features arising from existing or proposed developments will also be considered as part of the EIA. In line with NatureScot guidance (NatureScot, 2018), cumulative impacts will be assessed at a relevant biogeographical scale, such as the relevant Natural Heritage Zone (NHZ).

The Ornithology Chapter of the EIA Report will be additionally supported by Technical Appendices containing complete details of the surveys, analysis methods and results. Any data related to breeding Schedule 1 ornithological features will be included in a separate Confidential **Appendix 04** – which will not be available to the public.

#### 8.3.2 Collision Risk Modelling (CRM) Methods

CRM will be completed as part of the EclA process, based on flight activity data collected during the two years of baseline surveys. The Band model (Band *et al.*, 2007) will be used in accordance with NatureScot guidance. CRM will be undertaken for all target species considered to fly over the Site at collision risk height frequently enough to allow a robust analysis. Full details of the CRM will be provided in the Ornithology Chapter of the EIA Report, with the results of the modelling used to inform the assessment of collision risk impacts on target species.



### 8.3.3 Assessment of Significance

In accordance with the latest CIEEM guidance, the approach used for the EclA will consider the importance and sensitivity of an ornithological feature and the characteristics and severity of the impact and apply professional judgement to conclude whether the integrity of the feature will be affected. In line with CIEEM guidance, rather than implementing a matrix approach to determine significance, the assessment will consider the importance and sensitivity of receptors, characteristics and magnitude of potential impacts, and applying professional judgement to determine whether the integrity of the receptor would be affected.

For the purpose of the EclA, an impact that negatively affects the integrity of an ornithological feature will be considered significant. The significance of impacts will be assessed in an appropriate geographic context as stated in NatureScot guidance (NatureScot, 2018). The Site falls within NHZ 17 – West Central Belt.

## 8.4 Consultation

To date there has been no consultation with statutory and non-statutory bodies in relation to ornithology and the proposed development (the Stirling Council pre-application advice did not provide any detail on ornithology matters). However, consultation will be undertaken prior to submission of the EIA Report with relevant statutory and non-statutory consultees.

## 8.5 Matters Scoped In

Ornithological receptors scoped in to the assessment will be determined based on pathways for impacts, relevant guidance (NatureScot, 2018), baseline data recorded during surveys and professional judgement. Considering the current baseline conditions, it is proposed that the following will be scoped in for assessment:

- Potential impacts to breeding Schedule 1 and Annex I species referred to in Section 8.2.4 due to habitat loss, disturbance and displacement;
- Potential impacts to additional breeding wader species (oystercatcher, snipe, lapwing, curlew and redshank) due to habitat loss, disturbance and displacement; and
- Potential collision risk impacts to all target species in which sufficient flight data was recorded during the FAS.

An updated desk study will be undertaken prior to the EclA, which will inform the assessment and the final scoped in receptors.

## 8.6 Matters Scoped Out

Considering the current baseline conditions and distance from the Site, it is proposed that impacts on qualifying ornithological interests of the following statutory sites will be scoped out of assessment:

- Slamannan Plateau SPA and SSSI; and
- Firth of Forth SPA, SSSI and Ramsar site.

This is due to data from Mitchell (2012), which showed there is no connectivity between the Site and the Firth of Forth SPA / SSSI / Ramsar for pink-footed goose. Similarly, taiga bean goose, is known to forage very close to the Slamannan Plateau SPA and SSSI (Thorton *et al.*, 2021) and therefore there is no connectivity to the Site. Further to this, no taiga bean geese were recorded during the baseline surveys. Moreover, all statutory sites designated for ornithological features beyond 20km of the Site boundary will also be scoped out as it is unlikely that there will be any connectivity between these sites and the proposed development.



It is proposed that impacts on non-breeding target species will be scoped out, except where flight activity data recorded during the FAS is sufficient to assess collision risk impacts. Impacts to greylag goose, except for collision risk, will be scoped out, as although this species was recorded in most months of the baseline surveys it expected populations relate to increasing numbers of feral birds in Scotland.

As detailed in Section 3.4, decommissioning will be scoped out for assessment. Although it should be noted that impacts during this phase are considered to be similar to those during construction.

## 8.7 Approach to Mitigation

Potential impacts to key avian receptors have been limited as much as possible through sensitive design of the proposed development. However, additional mitigation will be implemented to further reduce impacts on receptors. This will include:

- Production of a Breeding Birds Protection Plan which will be informed by pre-construction surveys and include a range of typical mitigation measures and good practice to protect breeding species and comply with relevant legislation; and
- Specific mitigation measures as required for those species listed on Schedule 1 or Annex I which may require additional mitigation. This could include species-specific plans, for example for the breeding and potentially breeding raptors occupying the Site and surrounding area.

Although not considered mitigation, a Habitat Management Plan will be developed and implemented which will have the additional benefit of enhancing and creating breeding habitat for many bird species that use the sites and surroundings.

## 8.8 Questions for Consultees

Please confirm if consultees agree with:

- Q8.1: The proposed methods for assessment?;
- Q8.2: The extent of ornithological datasets obtained as part of the desk-based study?;
- Q8.3: The scope of the completed surveys?; and
- Q8.4: The scoped out impacts as described above?

## 8.9 References and Standard Guidance

Band, W, Madders, M, & Whitfield, D.P. (2007) Developing field and analytical methods to assess avian collision risk at wind farms. In: Janss, G, de Lucas, M & Ferrer, M (eds.) Birds and Wind Farms. Quercus, Madrid. 259-275.

Brown, A.F. and Shepherd, K.B. (1993) A method for censusing upland breeding waders. *Bird Study* 40: 189-195

CIEEM. (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Chartered Institute of Ecology and Environmental Management, Winchester.

Gilbert, G., Gibbons, D.W., Evans, J. (1998). *Bird Monitoring Methods*. RSPB, Sandy.

Hardey, J., Crick, H., Wernham, C., Riley, H., Etheridge, B. & Thompson, D. (2013). *Raptors: a field guide to survey and monitoring*, 3rd edition. The Stationery Office, Edinburgh.





NatureScot (2016) Assessing Connectivity with Special Protection Areas (SPAs). Guidance. Version 3.

NatureScot (2017) Recommended bird survey methods to inform impact assessment of onshore wind farms, (version 2, March 2017). NatureScot.

NatureScot (2018) Guidance - Assessing the significance of impacts on bird populations from onshore wind farms that do not affect protected areas. Version 2.

Stanbury, A.J., Eaton, M.A., Aebischer, N.J., Balmer, D., Brown, A.F., Douse, A., Lindley, P., McCulloch, N., Noble, D.G. & Win, I. (2021). The status of our bird populations: the fifth Birds of Conservation Concern in the United Kingdom, Channel Islands and Isle of Man and second IUCN Red List assessment of extinction risk for Great Britain. *British Birds* 114, 723-747.

Thornton, M. J., Mitchell, C., Griffin, L. R., Briers, R. A., Minshull, B., Maciver, A., & White, P. J. C. (2021). Multi-scale habitat selection and spatial analysis reveals a mismatch between the wintering distribution of a threatened population of Taiga Bean Geese *Anser fabalis* and its protected area. *Bird Study*, 68(2), 157–173.

<https://doi.org/10.1080/00063657.2021.1966740>

Wilson, M. W., Austin, G. E., Gillings S. and Wernham, C. V. (2015). Natural Heritage Zone Bird Population Estimates. SWBSG Commissioned report number SWBSG\_1504. pp72





## 9.0 Hydrology, Hydrogeology and Soils

### 9.1 Introduction

This section outlines the proposed scope of the EIA Report to assess the potential significant effects from the proposed development on soils, geology (including peat), hydrogeology and hydrology which together form the water environment.

### 9.2 Environmental Baseline and Potential Sources of Impact

The Site is located immediately to the north of Carron Valley Reservoir. In 2023, the Site and surrounding region received an annual rainfall total of approximately 1,820mm.

#### 9.2.1 Soils and Peat

Section 2.1 of this Scoping Report provides details on the publicly available mapping relating to soil and peat classifications at the Site. However, in summary, the priority peatland mapping published by NatureScot, shows the Site is not located within an area designated as priority peatland (Class 1 or Class 2).

There is some existing peat depth probing data for the Site which is shown on **Figure 20** and which confirms that peat depths are shallow and generally <0.5m, and thus is consistent with published data sources. Additional peat probing will be undertaken and will be used to inform the final Site layout. The probing will assess all elements of the proposed development including where new or improved access track and borrow pit(s) are proposed.

#### 9.2.2 Geology and Hydrogeology

The Site is shown by the British Geological Survey (BGS) to be underlain by basaltic rocks of the Campsie Lava Member, Gargunnoch Hills Lava Member, Overton Lava Member and Spout of Ballochleam Lava Member.

The bedrock is generally overlain glacial till and hummocky glacial deposits. Peat deposits are noted within the northern and central extent of the Site. Parts of the Site are shown to be absent of any superficial deposits.

The superficial and bedrock deposits beneath the Site are unlikely contain significant amounts of groundwater. The bedrock has been classified by BGS as a low productivity aquifer, whereby small amounts of groundwater may be present within the near surface weathered zone and secondary fractures. The glacial till and peat deposits also have a low bulk permeability.

#### 9.2.3 Hydrology and Designated Sites

The majority of the Site is located within the surface water catchment of the River Carron, in particular the Carron Valley Reservoir and Earl's Burn sub catchments. The north western extent of the Site is located within the surface water catchment of the Endrick Water.

Both the Carron Valley Reservoir sub catchment and the Endrick Water catchment have been designated as a Drinking Water Protected Area (DWPA).

Watercourses and groundwater within the Site may support local private and public supplies due to the rural nature of the Site.

SEPA flood mapping indicates that the majority of the Site is not at risk of flooding. A floodplain is shown in the north eastern corner, associated with the Earl's Burn, and to the south of the Site associated with Carron Valley Reservoir. Flood extents are largely confined to the watercourse corridor and loch margin. Small areas of surface water flood risk are



shown across the Site however these are localised to areas of low lying topography. Flood risk, therefore, is not considered a development constraint.

Review of NatureScot's SiteLink website indicates that no designated sites are noted within the Site nor within 500m of the Site boundary.

The Endrick Water, downstream of the Site, has been designated as part of the Endrick Water SSSI and SAC. The SSSI and SAC has been designated for fish assemblage, Scottish dock plant and quaternary and fluvial geomorphology outcrops.

#### **9.2.4 Potential Sources of Impact**

Without mitigation or adherence to best practice, impacts on soils, peat, geology, hydrogeology and hydrology could occur during the construction and operational phases of the proposed development. A summary of the potential effects on ground conditions and the water environment resulting from construction and operation of a wind farm is provided below. These will be considered in the EIA Report.

#### **Potential Impacts During Construction**

The following potential impacts during the construction phase will be considered in the EIA Report:

- Impacts on water quality and flows as a result of any required forest felling needed to establish the proposed development;
- Disturbance and loss of carbon rich soils and peat deposits;
- Ground instability (inc. peat slide risk if present);
- Impacts on surface water and groundwater quality from pollution from fuel, oil, concrete or other hazardous substances;
- Discharge of sediment-laden runoff to drainage system and watercourses;
- Increased flood risk to areas downstream of the Site during construction through increased surface runoff;
- Changes in groundwater levels, or saturation of peat deposits, from dewatering excavations;
- Potential change of groundwater flow paths and contribution to areas of peat and GWDTEs;
- Disturbance of watercourse bed and banks from the construction of culverts;
- Potential pollution impacts to Endrick Water SSSI and SAC, public and private water supplies (including DWPAs); and
- Disturbance and or pollution resulting from borrow pit formation and use.

#### **Potential Impacts During Operation**

The following potential impacts during the operational phase will be considered in the EIA Report:

- Increased runoff rates and flood risk, resulting from increases in areas of tracks and hard standing at turbines;
- Changes in natural surface water drainage patterns (which may affect water contribution to areas of peat and GWDTE);
- Changes to groundwater levels and groundwater movement;



- Longer term impacts on abstractions for water supplies, particularly any supplies dependent on groundwater; and
- Pollution impacts on surface water quality from maintenance work.

### 9.3 Method of Assessment and Reporting

The potential effects from the proposed development on ground conditions and the water environment will be assessed by completing a desk study and field investigation followed by an impact assessment, the processes of which are detailed below.

#### 9.3.1 Study Area

The study area for peat and soils will be within the Site boundary. The hydrological and hydrogeological study area will extend to 500m from the Site boundary and the cumulative effects study area will extend to 5km from the Site boundary. The soils and geology study area will include the Site and focus on the proposed infrastructure.

#### 9.3.2 Desk Study

An initial desk study will be undertaken to determine and confirm the baseline characteristics by reviewing available information relating to soils and peat, geology, hydrology, and hydrogeology such as groundwater resources, licensed and unlicensed groundwater and surface water abstractions, public and private water supplies, surface water flows, flooding, rainfall data, water quality and soil data. This will include review of published geological maps, Ordnance Survey maps, aerial photographs, and site-specific data such as site existing available peat probing data, digital terrain models (slope plans) and geological literature.

The desk study will identify sensitive features which may potentially be affected by the proposed development and will confirm the geological, hydrogeological, and hydrological environment.

#### 9.3.3 Field Surveys

The hydrological assessment specialists will liaise closely with the project ecology and geology / geotechnical specialists to ensure that appropriate information is gathered to allow a comprehensive impact assessment to be completed.

A detailed Site visit and walkover survey will be undertaken, to:

- Verify the information collected during the desk and baseline study;
- Identify drainage patterns, areas vulnerable to erosion or sediment deposition, and any pollution risks;
- Visit any identified GWDTEs (in consultation with the project ecologists);
- Visit any private water supply within the study area that might be affected by the proposed development to confirm details of the location of the abstraction, its type and use, as required;
- Prepare a schedule of potential watercourse crossings;
- Assess the Site geomorphology and conduct both additional Phase I and then Phase II peat depth probing;
- Advance a number of peat cores to assess the condition of the peat; and
- Inspect rock exposures, establish by probing an estimate overburden thicknesses (a probe is pushed vertically into the ground to refusal and the depth is recorded).



The desk study and field surveys will be used to identify potential development constraints and be used as part of the Site design.

Once the desk study is completed and sensitive soil and peat, geological and water features are confirmed an EIA Report will be prepared to assess the potential effects on soils and peat, geology and the water environment as a result of the construction and operation of the proposed development.

### 9.3.4 Assessment of Effects

The purpose of this assessment will be to:

- If peat is identified assess any areas susceptible to peat slide, using peat thickness and DTM data to analyse slopes;
- Assist in the micro-siting of turbines and tracks in areas of no peat or shallow peat and in the least hydrogeologically and hydrologically sensitive areas by applying buffer zones around watercourses and other hydrological features;
- Assess potential effects on soils, peat and geology;
- Determine what the likely effects of the proposed development are on the hydrological regime, including water quality, flow and drainage;
- Assess potential effects on water (including groundwater) dependent habitats;
- Determine suitable mitigation measures to prevent significant hydrological and hydrogeological effects; and
- Develop an acceptable code for working on the Site that will adopt best practice procedures, effective management and control of onsite activities to reduce or offset any detrimental effects on the geological, hydrogeological and hydrological environment.

It is anticipated the EIA report would include the following technical appendices:

- Peat landslide hazard and risk assessment;
- Peat condition assessment and management plan;
- Schedule of watercourse crossings;
- Private water risk assessment; and
- GWDTE risk assessment.

A qualitative risk assessment methodology will be used to assess the significance of the potential effects. Two factors will be considered: the sensitivity of the receiving environment and the potential magnitude should that potential impact occur.

This approach provides a mechanism for identifying the areas where mitigation measures are required, and for identifying mitigation measures appropriate to the risk presented by the proposed development. This approach also allows effort to be focused on reducing risk where the greatest benefit may result.

The sensitivity of the receiving environment (i.e. the baseline quality of the receiving environment as well as its ability to absorb the effect without perceptible change) and the magnitude of impacts will each be considered through a set of pre-defined criteria.

The sensitivity of the receiving environment together with the magnitude of the effect defines the significance of the effect, which will be categorised into level of significance.

A review of other existing and proposed developments near the proposed development will be undertaken and potential impacts on hydrology, hydrogeology and geology will be



assessed to identify cumulative impacts. With regard to the proposed development, it is likely that mitigation measures will be proposed that will have a neutral effect or provide betterment compared to baseline conditions. It is unlikely that there will be any significant residual or cumulative impact to report.

### **Peat Condition and Management Plan & Peat Landslide Hazard Risk Assessment**

A Stage 1 PMP will be prepared as a supporting technical appendix in line with NPF4 and SEPA Regulatory Position Statement: Developments on Peat (2012). The Waste Framework Directive (WFD) 2008/98/EC, transposed into National Law under The Waste Management Licensing (Scotland) Regulations 2011, sets out a requirement to apply a waste hierarchy. In terms of this project, this hierarchy should be considered as follows:

- Prevent excavation;
- Reduce volumes of peat excavated; and
- Reuse excavated peat in a manner to which it is suited.

The following works will be completed:

- Peat depths within the Site will be presented using a 100m grid where access is possible and a 10m grid at proposed infrastructure locations (the probing will also provide information of the substrate below the peat);
- A limited (in terms of aerial extent) geomorphological mapping exercise will be undertaken to link the topographic features with the underlying geology and to visit those areas of the Site that may be identified as potentially 'at risk from peat slide';
- The thickness of the peat will be established by probing and the underlying sub-strata confirmed by inspection of watercourses;
- The investigation will consider turbine locations, access routes, compounds and borrow pits for signs of existing or potential peat instability;
- Augering of a representative selection of peat probe locations will be undertaken and the proportion of acrotelmic and catotelmic peat recorded; and
- Output from the field survey will comprise a record of investigation locations and summary of peat depths and augering results.

A Peat Landslide Hazard Risk Assessment (PLHRA) will be completed using the Site survey data and slope analysis (using DTM data), if required by best practice guidance, highlighting areas that may be impacted by a peat slide so that appropriate mitigation measures can be identified.

### **Borrow Pit Assessment**

Suitability of materials at the Site will be verified and borrow pit search areas will be identified as part of the Borrow Pit Assessment. If appropriate areas are identified a description of likely materials, borrow pit size and the ability to supply appropriate materials for the construction of the proposed development will be included.

## **9.4 Consultation**

As part of the consultation phase of the project environmental data and views of the proposed development will be sought from:

- Stirling Council;
- SEPA;



- NatureScot;
- Scottish Water;
- Forth Rivers Trust;
- Forth District Salmon Board; and
- Loch Lomond Fisheries Trust.

## 9.5 Matters Scoped Out

At this stage, it is proposed that the following can be scoped out of detailed assessment:

- It is proposed to scope out effects on geology. While there will be effects arising from rock extraction for borrow pits, track construction and for turbine and crane pad areas, these are limited in area and do not extend beyond the immediate development footprint. No particularly sensitive geological features have been identified within the Site. Potential effects on carbon rich soils and peat will be assessed in full;
- Detailed Flood Risk Assessment. Published mapping confirms the Site is not located in an area at risk of fluvial, coastal or significant surface water flooding. It is proposed, therefore, that a simple screening of the potential sources of flooding (fluvial, coastal, groundwater, pluvial, infrastructure etc.) is presented in the EIA Report and measure that would be used to control the rate and quality of runoff will be specified in the EIA Report;
- A Drainage Impact Assessment. Design standards and measures which would be used to control and manage incident rainfall would be specified in the EIA Report. A Site drainage design plan would be prepared as part of the detailed Site design (post planning) and form part of the final Construction and Environmental Management Plan. This would be submitted to SEPA for approval at that stage;
- Water Quality Monitoring as part of the baseline assessment. Classification data is available from SEPA for the watercourses at Site and there are no known sources of potential water pollution at the Site that might give rise for the need for water quality monitoring; and
- Geomorphological Assessment. As part of the proposed baseline surveys photographs and records of existing or baseline water features will be recorded and presented in the EIA. It is not proposed to undertake a geomorphological audit or assess potential compensation flows and effects on geomorphology as it is expected that this will be undertaken in support of a CAR application which will be made and be used to regulate the operation of scheme, should the proposed development be granted planning permission.

## 9.6 Approach to Mitigation

The proposed development will undergo design iterations and evolution in response to constraints identified as part of the baseline studies and field studies so as to avoid and/or minimise potential effects on receptors where possible.

For example, it is expected that the following potential mitigation measures will be included in the design of the proposed development:

- Existing access tracks within the existing forest will be used and adopted where possible;





- A buffer of 50m will be applied to watercourses shown on 1:25,000 scale mapping where technically feasible;
- Site specific peat probing will be undertaken in accordance with current best practice guidance to allow a contemporary PLHRA and Peat Management Plan (PMP) to be prepared;
- A Site specific PLHRA will be prepared, and areas of potential increased peat slide risk will be avoided or mitigation measures to manage these risks;
- A carbon rich soils and PMP will be prepared to show how the integrity of soil and peat will be safeguarded; and
- Impacts on private water supply sources and areas of Ground Water Dependand Terrestrial Ecosystems (GWDTE) will be avoided.

There is much best practice guidance which has been developed to assist developers minimise the risks associated with wind farm construction and operation and this will be used to develop Site specific mitigation measures. Measures will be proposed to control and mitigate, for example, pollution risk (from anthropogenic and geogenic sources), flood risk, watercourse crossings, impacts on surface and groundwater flow paths, and management of peat and carbon rich soils.

Good practice measures will be applied in relation to pollution risk, and management of surface run-off rates and volumes. This will form part of the final Construction Environment Management Plan (CEMP) to be implemented for the proposed development.

## 9.7 Questions for Consultees

The following questions are directed to consultees:

- Q9.1: Published mapping confirms that most of the Site is not identified as being at flood risk. It is proposed, therefore, that a simple screening of potential flooding sources (fluvial, coastal, pluvial, groundwater etc.) is presented in the EIA Report. Is this approach acceptable?
- Q9.2: It is not proposed to prepare a detailed drainage design. Rather measures that would be used to control the rate and quality of runoff will be specified in the EIA Report. Again, is this acceptable?
- Q9.3: Site investigations, including detailed peat probing, augering and condition assessment, private water survey, and GWDTE assessment will be undertaken as part of the proposed assessment. Should any additional investigation or data sources be considered when assessing baseline conditions?
- Q9.4: It is not proposed to undertake any water quality sampling, establish groundwater monitoring points, surface water monitoring points or undertake leachability trials of any rock as there is published data that can be used to characterise baseline conditions and complete the impact assessment. Is this acceptable?
- Q9.5: Please advise if there is any specific information or methodology that should be used / followed as part of the private water supply risk assessment?
- Q9.6: Do you agree that the scope of the proposed assessment is appropriate?

## 9.8 References and Standard Guidance

EC Water Framework Directive (2000/60/EC).

EU Drinking Water Directive (98/83/EC).





The Environment Act 1995.

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

Environmental Protection Act 1990.

The Flood Risk Management (Scotland) Act 2009.

Water Environment and Water Services (Scotland) Act 2003.

Water Environment (Controlled Activities) Regulations 2011.

The Water Supply (Water Quality) (Scotland) Regulations 2001.

Private Water Supplies (Scotland) Regulations 2006.

The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017.

National Planning Framework 4 (NPF4).

Stirling Council Local Development Plan.

Good Practice during Windfarm Construction, 4th Edition (Scottish Renewables, Scottish Natural Heritage (now NatureScot), Scottish Environment Protection Agency, Forestry Commission Scotland, Historic Environment Scotland, Marine Scotland Science and AEECoW, 2019).

Land Use Planning System – SEPA Guidance Note 31 (Guidance on Assessing Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems), Version 3, (SEPA, 2017).

Land Use Planning System – SEPA Guidance Note 2a (Flood), Version 4, (SEPA, 2018)

Land Use Planning System – SEPA Guidance Note 2e (Soils), Version 1 (SEPA, 2015)

Land Use Planning System – SEPA Guidance Note 4 (Onshore Windfarm Developments), Version 9, SEPA, 2017).

Control of Water Pollution from Linear Construction Projects – Technical Guidance, C648 (CIRIA, 2006).

Engineering in the Water Environment – Good Practice Guide: River Crossings (SEPA, 2010).

Engineering in the Water Environment – Sediment Management (SEPA 2010).

Position Statement – Culverting of Watercourses (SEPA, 2015).

Regulatory Position Statement – Developments on Peat (SEPA, 2010).

The SuDS Manual C753 (CIRIA, 2015).

Environmental Good Practice on Site C741 (CIRIA, 2015).

Developments on Peat and Offsite Uses of Waste Peat (SEPA, 2017).

Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments (Scottish Government, 2017).

Developments on Peatland - Guidance on the assessment of peat volumes, re-use of excavated peat and the minimisation of waste (Scottish Renewables & SEPA, 2012).



## 10.0 Archaeology and Cultural Heritage

### 10.1 Introduction

The 'cultural heritage' of an area comprises archaeological sites, historic buildings, Inventoried Gardens and Designed Landscapes (GDLs), Inventoried Battlefields and other historic environment features. Alongside its inherent values, the 'setting' of an asset may also contribute to its cultural heritage significance.

The cultural heritage impact assessment will:

- Identify cultural heritage assets that may be subject to significant effects, both within the limits of the proposed development and within a proposed surrounding radius of 10km from the proposed turbine locations;
- Establish the potential for currently unknown archaeological assets to survive buried within the Site;
- Assess the predicted effects on these assets; and
- Propose a programme of mitigation where appropriate.

It will consider direct effects (such as physical disturbance), indirect effects (such as vibration), effects upon an assets setting where it contributes to significance, and cumulative effects (where assets affected by the proposed development are also likely to be affected by other unrelated development proposals).

The proposed approach to the assessment of effects on cultural heritage is set out below. The assessment would be undertaken by Erin Ashby (MSc, PCIfA), Senior Archaeology and Heritage Consultant, and overseen by Beth Gray (MA Hons, ACIfA), Associate Archaeology and Heritage Consultant.

### 10.2 Pre-Application Consultation

On 19 July 2024, Stirling Council issued their initial Pre-Application Advice response with regards the proposed development. Some minor Cultural Heritage related comments were included in this response, focusing on the proximity of the Site to the Scheduled Monument Sir John de Graham's Castle being a constraint.

Including through the process of this EIA Scoping Request, further consultation will be undertaken with Stirling Council and Historic Environment Scotland in relation to Cultural Heritage and Archaeology.

## 10.3 Environmental Baseline and Potential Sources of Impact

### 10.3.1 Assets Within the Site Boundary

There are no Designated Heritage Assets within the Site boundary. However, there are two non-designated heritage asset recorded on the Historic Environment Record (HER) situated within the Site boundary. The first comprises the site of the Carron Valley Reservoir Farmstead (3375) and is located along the southern border of the Site, approximately 0.9km south of proposed Turbine 2. The farmstead appears to be no longer standing, or at least ruinous in nature, and is undated. It is likely post-medieval in date, due to its appearance on historic Ordnance Survey Mapping, but it pre-dates the reservoir itself. The second is Boon a' Kirk Farmstead (1918), located approximately 1km south of proposed Turbine 3. Boon a' Kirk Farmstead is visible as a ruinous structure on aerial photographs and is likely post-medieval in date.



A full commercial HER data search will be undertaken ahead of the baseline survey and used to inform an understanding of key constraints.

### 10.3.2 Potential Sources of Impact Within the Site Boundary

As stated, there are two recorded heritage assets on the HER noted as being within the Site. Whilst positioned outside of the current placement of the turbines, these known cultural heritage assets may be susceptible to a significant level of direct or indirect impact as a result of the construction of the associated infrastructure (e.g., access tracks, substations). In addition, any design changes for the placement of the turbines may incur potential direct impacts on the heritage assets. Potential mitigation is discussed in Section 10.6 of this scoping report.

Furthermore, there is the potential for direct impact on any unrecorded cultural heritage assets within the Site as a result of the construction process. Relevant mitigation measures will be embedded within the design of the proposed development as design progresses.

If there are any further ground-breaking works undertaken during operation or decommissioning of the wind farm (e.g., track widening), then there is the potential for further impact on recorded or unrecorded heritage assets. If this is the case, then further mitigation methods, such as a watching brief or design changes to proposed infrastructure may be required.

### 10.3.3 Assets Outwith the Site Boundary

Within 10km of the proposed turbines, there are a total of 208 designated heritage assets. This includes 57 Scheduled Monuments, 14 Category A Listed Buildings, seven Conservation Areas, three Inventoried Battlefields, three Inventoried GDLs, and one World Heritage Site. Of the Listed Buildings, there are six Category B Listed Buildings within 5km of the proposed turbine locations. There are no Conservation Areas within 5km of the proposed turbine locations.

Of the assets, Sir John de Graham's Castle (SM4278) is the closest to the Site boundary, located approximately 80m to the west of the Site boundary and approximately 0.38km to the west of Turbine 1.

The World Heritage Site, Scheduled Monuments, Category A Listed Buildings, Inventoried Battlefields, and GDLs within 10km are noted in the appraisal Table in **Appendix 05**. In addition, the Category B Listed Buildings within 5km are noted within **Appendix 05**.

**Appendix 06** shows wirelines of the proposed development from selected heritage assets.

### 10.3.4 Potential Sources of Impact Outwith the Site Boundary

Setting impacts are most likely to occur as part of the construction and operational phases of development, these will be considered as part of the EIA Report Chapter.

Four designated cultural heritage assets within 10km of the proposed turbine locations will be subject to detailed settings assessment within the EIA Report Chapter, as there is the potential for the proposed development to have a significant effect upon them.

To provide a preliminary list of assets that will be subject to a detailed assessment, all assets noted in Section 10.3.3 have been subject to an appraisal found in **Appendix 05**. This Appendix has aimed to create a proportionate scope for the assessment and will be an evolving document throughout the EIA process. Assets that fall out of the proposed study area, the ZTV, and that do not have a third viewpoint that contributes to the significance of the monument have been scoped out of assessment. Assets that have been scoped in may be scoped out and vice versa, dependent on the final layout as a result of consultee comments.



All designated cultural heritage assets within 10km, along with the ZTV indicating their visibility of the proposed turbines, are depicted on **Figure 21**.

The assets scoped in for further assessment within the EIA Report Chapter after the initial heritage appraisal are as follows:

- Waterhead, two standing stones 800m ENE of (SM2719);
- Todholes Cairn, 1000m NNE of (SM2492);
- Todholes Cairn, 1300m NNW of (SM4491); and
- Sir John de Graham’s Castle (SM4278).

Visualisations, in the form of photomontages, will be produced for the above.

## 10.4 Method of Assessment and Reporting

### 10.4.1 Study Area

For the purposes of this assessment, a Study Area extending 10km from the proposed turbines will be utilised for the assessment of impacts on setting<sup>37</sup>.

Assessment of direct and indirect effect on assets (as defined in Section 10.4.2) will be assessed on known heritage assets within the Site boundary. Known heritage assets within the Site and within a 1km distance of the Site will be used to inform of the potential for unrecorded archaeological remains within the Site boundary.

The sources identified within **Table 10-1** will be consulted to inform the assessment, however, this list is not exhaustive.

**Table 10-1: Sources to be Consulted**

Subject	Author Summary	Source
Designated cultural heritage assets (except conservation areas)	The database of Historic Environment Scotland (HES)	HES digital data download
Conservation Areas	Stirling Council, North Lanarkshire Historic Environment Teams and HES	HES digital data download
Non-designated cultural heritage assets	Data held by the Stirling Council and North Lanarkshire Historic Environment Teams and displayed on Pastmap	Digital data purchased from the Stirling Council and North Lanarkshire Historic Environment Teams as download and shown on Pastmap website
Historic Mapping	National Library of Scotland	National Library of Scotland website
Historic Environment Information	Canmore online database curated by Historic Environment Scotland	Canmore online database
	Unpublished reports	Various
	Published works of synthesis	Various

<sup>37</sup> There is no guidance defining what the extent of an appropriate ‘study area’ should be for the archaeological and cultural heritage assessment of wind farms. Any given study area will therefore represent an exercise in professional judgment, refined to point of agreement between stakeholders during consultation.



Subject	Author Summary	Source
Aerial Photography	HES	HES database Canmore and National Collection of Aerial Photography (NCAP) (online)
Historic Land Use Assessment	HES	Online

## 10.4.2 Scope

### Assets within the Site

Designated and non-designated assets within the Site will be assessed in order to determine any direct (physical) and indirect (non-physical) impacts. Should the Stirling Council Archaeology Officer identify any non-designated assets that they consider to be of national/regional significance, and which they consider derive significance from their setting, these should be made known to the Applicant via consultation.

### Assets outwith the Site

All nationally significant designated assets (**Appendix 05**) outwith the Site but within the 10km Study Area will be subject to setting assessment in order to determine any impacts.

### Consultation

Based on the results of the baseline study, constraint mapping will be generated using GIS software to show mapped heritage assets in relation to a ZTV. This will filter out those assets that do not require further assessment. It will also be used to identify and agree on the most potentially sensitive assets; these may then require computer-generated visualisations to be produced as part of their assessment, in liaison with consultees.

Consultation will be undertaken with HES in relation to the method of assessment employed in assessing those heritage assets within their remit; these include: Scheduled Monuments, Category A Listed Buildings, GDLs, and Inventoried Battlefields. The Stirling Council and North Lanarkshire Council Historic Environment Teams will be consulted in relation to non-designated heritage assets and designated heritage assets of regional significance, and any non-designated assets they consider to be of higher significance.

### Field Surveys

A targeted Site inspection will be carried out in relation to those recorded assets likely to be impacted by the proposed development; the aim of this would be to establish the condition of any recorded assets and identify the potential for any additional presently unrecorded assets.

Targeted field inspection of other assets will also be undertaken following a desk-based comparison of asset mapping with ZTV and satellite imagery; the aim of this would be to identify and inspect any designated heritage assets potentially susceptible to impact as a result of change to setting as a consequence of the proposed development.

### Assessment and Types of Impact

Impacts have the potential to be caused by the proposed development where it changes the baseline condition of either the asset itself or its setting; although change does not necessarily result in an impact.

In accordance with EIA Regulations, this assessment will identify impacts and effects as either direct or indirect, adverse or beneficial, and short-term, long-term or permanent. The definition of impact is described below:



- Direct (physical) impacts: occur where the physical fabric of the asset is removed or damaged, or where it is preserved or conserved, as a direct result of the proposal. Such impacts are most likely to occur during the construction phase and are most likely to be permanent;
- Indirect (physical) impacts: occur where the fabric of an asset, or buried archaeological remains, is removed or damaged, or where it is preserved or conserved, as an indirect result of the proposal, even though the asset may lie some distance from the proposal. Such impacts are most likely to occur during the construction phase and are most likely to be permanent;
- Setting impacts: result from the proposal causing change within the setting of a heritage asset that affects its cultural significance or the way in which it is understood, appreciated, and experienced. Such impacts are generally, but not exclusively, visual, occurring directly as a result of the appearance of the proposal in the surroundings of the asset. Setting impacts may also relate to other senses or factors, such as noise, odour or emissions, or historical relationships that do not relate entirely to intervisibility, such as historic patterns of land-use and related historic features. Such impacts may occur at any stage of a proposal's lifespan and may be permanent, reversible, or temporary; and
- Cumulative impacts: can relate to the physical fabric or setting of assets. They may arise as a result of impact interactions, either of different impacts of the proposal itself, or additive impacts resulting from incremental changes caused by the proposal together with other projects already in the planning system or allocated in a Local Development Plan.

Assessment will be undertaken separately for direct impact, indirect impact and impact to setting. Direct and indirect impacts are those which would change the heritage significance of an asset through physical alteration; setting impacts are those which would affect the heritage significance of an asset by causing change within its setting.

Direct impacts upon the significance of heritage assets will take into account the level of their heritage significance (where known) and the magnitude (extent) of the identified impacts.

Setting impacts on the significance of heritage assets will be identified and assessed with reference to Managing Change in the Historic Environment: Setting (HES 2020) and the guidance set out by NatureScot and HES (2019). Assessment will be carried out in the following stages:

- Initial consideration of intervisibility and other factors leading to the identification of potentially affected assets;
- Assessment of the cultural heritage significance of potentially affected assets;
- Assessment of the contribution of setting to the cultural heritage significance of those assets;
- Assessment of the extent to which change to any contributing aspects of the settings of those assets, as a result of the proposed development, would affect their cultural heritage significance (magnitude of impact); and
- Determination of the significance of any identified effects.

### 10.4.3 Zone of Theoretical Visibility

The settings assessment will be assisted by a ZTV calculation, presented in **Figure 21**. A ZTV calculation maps the predicted degree of visibility of a proposed development from all points within a proportionate, defined study area around the Site, as would be seen from an average observer's eye level (two metres above ground level). The ZTV model presented in





**Figure 21** is based upon the maximum level of theoretical visibility, i.e., the maximum height of the turbine blade tips.

#### 10.4.4 Cultural Heritage Significance

The categories of cultural heritage significance to be referred to are presented in **Table 10-2**, which will act as an aid to consistency in the exercise of professional judgement and provide a degree of transparency for others in evaluating the conclusions drawn.

The significance categories take into account factors such as: designation, status and grading. For non-designated assets, consideration will be given to their inherent heritage interests, intrinsic, contextual, and associative characteristics. In relation to these assets, the assessment will focus upon an assessment of the assets' inherent capability to contribute to our understanding of the past; the character of their structural, decorative and field characteristics as informed by the HER and Canmore records and / or Site visit observations; the contribution of an asset to their class of monument, or the diminution of that class should an asset be lost; and how a site relates to people, practices, events, and/or historical or social movements. Assessments of the cultural significance of specific assets, where recorded within the HER, will be taken into account where appropriate.

**Table 10-2: Cultural Heritage Significance**

Heritage Significance	Explanation
Highest	Sites of international importance, including: <ul style="list-style-type: none"> <li>• World Heritage Sites</li> <li>• Sites on the 'Tentative List' for WHS status under the Cultural Category</li> </ul>
High	Site of National importance, including: <ul style="list-style-type: none"> <li>• Scheduled Monuments</li> <li>• Category A Listed Buildings</li> <li>• Gardens and Designed Landscapes included on the national inventory</li> <li>• Designated Battlefields</li> <li>• Non-designated assets of equivalent significance</li> </ul>
Medium	Sites of Regional/local importance, including: <ul style="list-style-type: none"> <li>• Category B and C Listed Buildings</li> <li>• Some Conservation Areas</li> <li>• Non-designated assets of equivalent significance.</li> </ul>
Low	Sites of minor importance or with little of the asset remaining to justify a higher importance
None	Sites that are of no heritage significance
Unknown	Further information is required to assess the significance of these assets

#### 10.4.5 Magnitude of Impact

Determining the magnitude of any likely impacts will include consideration of the nature of the activities proposed during the construction and operational phases of the proposed development.

The changes could potentially include direct change (e.g. ground disturbance), and indirect change (e.g. visible change, noise, vibration, traffic movements affecting the setting of the





asset). Impacts may be beneficial or adverse, and may be short term, long term or permanent.

The magnitude of any effects will be assessed using professional judgment, with reference to the criteria set out in **Table 10-3**.

**Table 10-3: Cultural Heritage Magnitude of Impact**

Magnitude of Impact	Explanatory Criteria
High Beneficial	The proposed development would considerably enhance the cultural heritage significance of the affected asset, or the ability to understand, appreciate and experience it.
Medium Beneficial	The proposed development would enhance, to a clearly discernible extent, the cultural heritage significance of the affected asset, or the ability to understand, appreciate and experience it.
Low Beneficial	The proposed development would enhance, to a minor extent, the cultural heritage significance of the affected asset, or the ability to understand, appreciate and experience it.
Very Low Beneficial	The proposed development would enhance, to a very minor extent, the cultural heritage significance of the affected asset, or the ability to understand, appreciate and experience it.
Neutral/None	The proposed development would not affect (or would have harmful and enhancing impacts of equal magnitude upon) the cultural heritage significance of the affected asset, or the ability to understand, appreciate and experience it.
Very Low Adverse	The proposed development would erode, to a very minor extent, the cultural heritage significance of the affected asset, or the ability to understand, appreciate and experience it. This level of indirect impact would not be considered to affect the integrity of the asset's setting.
Low Adverse	The proposed development would erode, to a minor extent, the cultural heritage significance of the affected asset, or the ability to understand, appreciate and experience it. This level of indirect impact would rarely be considered to affect the integrity of the asset's setting.
Medium Adverse	The proposed development would erode, to a clearly discernible extent, the cultural heritage significance of the affected asset, or the ability to understand, appreciate and experience it. This level of indirect impact might be considered to affect the integrity of the asset's setting.
High Adverse	The proposed development would considerably erode the cultural heritage significance of the affected asset, or the ability to understand, appreciate and experience it. This level of indirect impact would probably be considered to affect the integrity of the asset's setting.

#### 10.4.6 Significance of Impact

The categories of impact referred to, and the criteria used in their determination, are presented in **Table 10-4**.



**Table 10-4: Significance of Impact**

Impact	Criteria
Major	Severe harm or notable enhancement, such as total loss of significance of the asset or of the integrity of its setting, or exceptional improvement of the cultural heritage significance of the asset and/or the ability to understand, appreciate and experience it.
Moderate	Harm or enhancement, such as the introduction or removal of an element that would affect the cultural heritage significance of the asset and the ability to understand, appreciate and experience it to a clearly discernible extent.
Minor	Harm or enhancement to the asset’s heritage significance and/or to the ability to understand, appreciate and experience it to a modest extent, such that the majority of the asset’s inherent interests and aspects of setting would be preserved.
Very Minor	Harm or enhancement to the asset’s cultural heritage significance and/or to the ability to understand, appreciate and experience it, that is barely discernible.
Negligible/Nil	The development would not affect the cultural heritage significance of the asset and/or the ability to understand, appreciate and experience it, or would have harmful and enhancing impacts of equal magnitude.

**Table 10-5** provides a matrix that relates the cultural heritage significance of the asset to the magnitude of impact on its significance, to produce an overall anticipated level of impact. This assessment will be undertaken separately for physical (direct and indirect) impacts and impacts resulting from change to the setting of heritage assets.

**Table 10-5: Cultural Heritage Impact Matrix**

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

### 10.4.7 Mitigation

Where adverse effects on cultural heritage assets are identified, measures to prevent, reduce and/or, where possible, offset these effects, will be proposed. Potential mitigation measures can be discussed in terms of direct, indirect and settings impact.

Suitable measures for mitigating direct and indirect impacts might include:



- The micro-siting of proposed development infrastructure away from sensitive locations;
- The fencing off or marking out of heritage assets or features in proximity to construction activity in order to avoid disturbance where possible;
- A programme of archaeological work where required, such as an archaeological watching brief during construction activities in or in proximity to areas of archaeological sensitivity, or excavation and recording where impact is unavoidable; and/or
- A working protocol to be implemented should unrecorded archaeological features be discovered.

Suitable measures for mitigating any settings impacts might include:

- Alteration of the proposed turbine layout; and/or
- Reduction of proposed turbine heights.

#### **10.4.8 Residual Impacts**

Residual impacts are those that remain even after the implementation of suitable mitigation measures. Residual impacts will be identified, and the level of those residual impact defined with reference to **Tables 10-4** and **10-5**.

#### **10.4.9 Significance of Impact**

Professional judgment will be used in the determination of whether any impacts/residual impacts are 'Significant' or 'Not Significant' for the purposes of EIA.

With reference to the matrix presented in **Table 10-6** and Section C.8.8 of the EIA Handbook (NatureScot, 2020), any impacts identified as 'Major' or 'Moderate' within the matrix would almost certainly be considered 'Significant'. With any impacts identified as below 'Moderate' considered 'Not Significant'.

A clear and justified statement will be made as to whether any identified impacts are 'Significant' or 'Not Significant' for the purposes of EIA. In cases where the impact is identified as significant, the impact of the proposals on the integrity of the asset would be assessed, following National Planning Framework 4 (NPF4, 2023), Policy 7h.

#### **10.4.10 Cumulative Effect**

A cumulative effect is considered to occur when there is a combination of:

- An effect on an asset or group of assets due to changes resulting from the development subject of assessment; and
- An effect on the same asset or group of assets resulting from another development (consented or proposed) within the surrounding landscape.

Consideration of other developments will be limited to:

- Wind farm planning applications within 10km of the affected assets that have been submitted and have a decision pending; and
- Wind farm planning applications within 10km of the affected assets which have been granted permission but not yet constructed.

Any effect resulting from operational wind farms would be considered as part of the baseline impact assessment. Cumulative impact would be considered in two stages:



- Assessment of the combined impact of the developments, including the proposed development; and
- Assessment of the extent to which the proposed development contributes to the combined impact.

## 10.5 Matters Scoped Out

On the basis of the work undertaken to date, the professional judgement of the cultural heritage team, and experience of other comparable projects, it is considered that indirect and cumulative impacts of the proposed development on Category C Listed Buildings can be scoped out of the EIA in relation to cultural heritage. As per best practice guidance within EIA Handbook (NatureScot, 2019), Category C Listed Buildings are of local rather than national or regional importance, unless in the opinion of an assessor the designation should be higher.

Category B Listed Buildings outwith the 5km of the proposed turbines have been scoped out of any further assessment, with the exception of those wherein specific views are considered to contribute to their significance and/or to the ability to understand, appreciate and experience them. Category B Listed Buildings located more than 5km away from the Site have been scoped out of further assessment.

The significance of a Conservation Area derives from its local heritage and the assets that it contains, rather than the wider landscape. As such, any conservation area outwith 5km has been scoped out, with the justification that, even if visibility between the proposed development and the conservation areas may still occur, the conservation areas' significance would not be diminished.

It is also considered that any assets that fall outwith the ZTV (and where those assets' approaches also fall outwith the ZTV) can be scoped out of the EIA in relation to cultural heritage.

## 10.6 Approach to Mitigation

As stated in the proposed methodology, there are multiple methods of mitigation that may be employed to reduce the potential for impact as a result of the proposed development.

Suitable measures for mitigating direct and indirect impacts might include:

- The micro-siting of proposed development infrastructure away from sensitive locations;
- The fencing off or marking out of heritage assets or features in proximity to construction activity in order to avoid disturbance where possible;
- A programme of archaeological work where required, such as an archaeological watching brief during construction activities in or in proximity to areas of archaeological sensitivity, or excavation and recording where impact is unavoidable; and/or
- A working protocol to be implemented should unrecorded archaeological features be discovered.

The cultural heritage team will work with the design team to ensure that any known archaeology within the Site is avoided.

Suitable measures for mitigating any setting impacts might include:

- Alteration of the proposed turbine layout; and
- Reduction of proposed turbine heights.



These mitigation measures will be embedded into the design of the proposed development and developed through careful consultation with the relevant statutory consultees.

## 10.7 Questions for Consultees

The following questions are directed to consultees:

- Q10.1: Do consultees agree with the proposed scope of the assessment (including elements to be Scoped out), including the proposed Study Areas?
- Q10.2: Do consultees agree with the proposed assessment methodology?
- Q10.3: Are consultees satisfied with the mitigation measures proposed?
- Q10.4: Are consultees satisfied with the locations and types of visualisations proposed?

## 10.8 References and Standard Guidance

The assessment will be undertaken in accordance with the following principal relevant legislation:

- The Ancient Monuments and Archaeological Areas Act 1979;
- The Planning (Listed Buildings and Conservations Areas (Scotland) Act 1997;
- The Historic Environment (Amendment) (Scotland) Act 2014; and
- Scottish Statutory Instrument No. 101 The Electricity Works (Environment Impact Assessment) (Scotland) Regulations 2017.

The Scottish Government, Historic Environment Scotland and the Highland Council have issued a number of statements of policy with respect to dealing with the historic environment in the planning system:

- National Planning Framework 4 (NPF4; 2023);
- Onshore Wind Turbines: Planning Advice (2014);
- Planning Advice Note 2/2011: Planning and Archaeology;
- Highland-wide Local Development Plan (2012);
- Our Past, Our Future: The Strategy for Scotland's Historic Environment (2023);
- Historic Environment Policy for Scotland (HEPS 2019); and
- Designation Policy and Selection Guidance (2020).

Relevant guidance and technical standard documents comprise:

- Historic Environment Scotland Guidance on Managing Change in the Historic Environment: Setting (2020);
- A Guide to Climate Change Impact: On Scotland's Historic Environment (2019);
- Scottish National Heritage (NatureScot) and Historic Environment Scotland Environmental Impact Assessment Handbook: Guidance for competent authorities, consultation bodies, and others involved in the Environmental Impact Assessment Process in Scotland (2019); and
- Chartered Institute for Archaeologists Standard and Guidance for Historic Environment Desk Based Assessment (2014, updated 2020).



## 11.0 Noise and Vibration

### 11.1 Introduction

Noise will be emitted as a result of the proposed development during the construction, operation and decommissioning phases. This section provides a summary of the noise effects anticipated at each stage of the development and, where appropriate, details of the proposed assessment work.

### 11.2 Environmental Baseline and Potential Sources of Impact

The proposed development is located within a rural location. There are a number of scattered residential properties around the proposed development with the closest occupied property being approximately 1km from the proposed turbines (based on the current draft Site layout).

There are a number of operational, consented and proposed wind farm developments surrounding the proposed development and they lie to the north east, north and north west of the Site.

The nearest noise-sensitive receptors surrounding the proposed development will be considered within the noise assessment, as well as receptors located in proximity to cumulative wind farm developments, as required.

Cumulative wind farm developments within 10km of the proposed development will be considered within the cumulative operational noise assessment (although it may be possible to scope out some developments within that area if predicted noise levels at the nearest Noise Sensitive Receptors (NSRs) are low).

### 11.3 Method of Assessment and Reporting

#### 11.3.1 Construction Noise

The final design of the proposed development is yet to be determined, but should the Site layout be such that a construction noise assessment is required, then it will be undertaken in accordance with BS5228-1: 2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites - Noise'.

#### 11.3.2 Operational Noise

The Scottish Government's Planning Advice Note PAN1/2011 'Planning and Noise' refers to the 'Onshore Wind Turbines' web based document which in turn states that ETSU-R-97 '*The Assessment of Rating of Noise from Windfarms*' should be used by Planning Authorities '*to assess and rate noise from wind energy developments until such time that an update is available.*' The web based document also refers to the Institute of Acoustics 'A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise' (IOA GPG) as a source, which provides:

*'significant support on technical issues to all users of the ETSU-R-97 method for rating and assessing wind turbine noise, and should be used by all IOA members and those undertaking assessments to ETSU-R-97. The Scottish Government accepts that the guide represents current industry good practice.'*

ETSU-R-97 details a methodology for establishing noise limits for proposed wind farm developments and these limits should not be exceeded. ETSU-R-97 states that noise limits should be set relative to existing background noise levels at the nearest receptors and that these limits should reflect the variation in both turbine source noise and background noise with wind speed. Separate noise limits apply for quiet daytime and for night-time periods.





Quiet daytime limits are chosen to protect a property's external amenity, and night-time limits are chosen to prevent sleep disturbance indoors, with windows open.

ETSU-R-97 recommends that wind farm noise for the quiet daytime periods should be limited to 5 dB(A) above the prevailing background or a fixed minimum level within the range 35 - 40 dB  $L_{A90,10min}$ , whichever is the higher. The precise choice of criterion level within the range 35 – 40 dB(A) depends on a number of factors, including the number of dwellings in the neighbourhood of the wind farm (relatively few dwellings suggest a figure towards the upper end), the effect of noise limits on the number of kWh generated (larger sites tend to suggest a higher figure) and the duration and level of exposure to any noise. These factors will be taken into account with justification for deriving suitable noise limits included in the noise assessment.

An exception to the setting of both the quiet daytime and night-time fixed minimum limit occurs where a property occupier has a financial involvement with the proposed development. In that case the fixed minimum limit can be increased to 45 dB  $L_{A90,10min}$  or the prevailing background noise  $L_{A90}$  plus 5 dB, whichever is the greater for both the quiet daytime and night-time periods.

A background noise survey may not be required for situations where predicted wind turbine noise levels at the nearest noise sensitive properties is limited to an  $L_{A90,10min}$  of 35dB(A) up to wind speeds of 10m/s at 10m, as the protection of the amenity of those properties can be controlled through a simplified noise condition as detailed in ETSU-R-97. ETSU-R-97 states that:

*'For single turbines or wind farms with very large separation distances between the turbines and the nearest properties, a simplified noise condition may be suitable. If the noise is limited to an  $L_{A90,10min}$  of 35dB(A) up to wind speeds of 10m/s at 10m height, then this condition alone would offer sufficient protection of amenity, and background noise surveys would be unnecessary.'*

The noise assessment for the proposed development will be undertaken in three stages:

- Determine the 'Total ETSU-R-97 Noise Limits' which are applicable to the operation of all schemes in the area;
- Undertake a cumulative assessment (where required) to determine whether predictions from all cumulative schemes meet the 'Total ETSU-R-97 Noise Limits'; and
- Derive a set of Site Specific Noise Limits (for the proposed development) and undertake predictions to determine whether the proposed development can operate within the Site Specific Noise Limits.

Given the proximity of other operational and consented schemes in the area and the fact that background noise monitoring has already been undertaken at a number of the closest properties, a review will be undertaken of the previously collected datasets to determine whether additional noise monitoring will be required.

Given the existing noise limits allocated to others schemes in the area, it is proposed that the 'Total ETSU-R-97 Noise Limits' for the assessment will be based on a 40 dB noise limit during the daytime period and a 43 dB noise limit during the night-time period.

The guidance contained in the IOA GPG will be used to establish suitable Site Specific Noise Limits which fully take account of the proportion of the Total ETSU-R-97 Noise Limits which has been allocated too, and can realistically be used by, existing operational and consented wind farms in the area.

The noise assessment will include predictions of likely wind turbine noise levels across a range of wind speeds to demonstrate compliance with the Total ETSU-R-97 and Site





Specific Noise Limits. A cumulative noise assessment will also be undertaken in order to consider the consented, operational and proposed (in planning) wind farms/ turbines within the vicinity of the proposed development. The assessment will be undertaken in accordance with ETSU-R-97 and the IOA GPG.

## 11.4 Consultation

Prior to commencement of the noise assessment, consultation will be undertaken with the Environmental Health Department at the Stirling Council in order to agree the methodology for the noise assessment.

## 11.5 Matters Scoped Out

### 11.5.1 Decommissioning Noise

The potential noise impacts from the decommissioning phase will be no greater than those predicted during the construction phase (as decommissioning is effectively a reversal of the construction process). On that basis, it is not proposed to undertake an assessment of decommissioning noise and that it should be scoped out.

### 11.5.2 Vibration

Given the nature of construction activities proposed and the relative distances from residential receptors, the risk of ground borne vibration impacting on residential receptors is considered very low, as such it is not proposed that a vibration assessment be undertaken and that a vibration assessment is scoped out.

### 11.5.3 Low-Frequency Noise

A study, published in 2006 by acoustic consultants Hayes McKenzie on the behalf of the Department of Trade and Industry (DTI), investigated low frequency noise from wind farms. This study concluded that there is no evidence of health effects arising from infrasound or low frequency noise generated by wind turbines.

In February 2013, the Environmental Protection Authority of South Australia published the results of a study into infrasound levels near wind farms. This study measured infrasound levels at urban locations and rural locations with wind turbines close by, and rural locations with no wind turbines in the vicinity. It found that infrasound levels near wind farms are comparable to levels away from wind farms in both urban and rural locations. Infrasound levels were also measured during organised shut downs of the windfarms; the results showed that there was no noticeable difference in infrasound levels whether the turbines were active or inactive.

Bowdler et al., (2009) concluded that:

*'...there is no robust evidence that low frequency noise (including 'infrasound') or ground-borne vibration from wind farms generally has adverse effects on wind farm neighbour'.*

During a planning Appeal (PPA-310-2028, Clydeport Hunterston Terminal Facility, approximately 2.5 km south-west of Fairlie, 9 Jan 2018), the health impacts related to low frequency noise associated with wind turbines were considered at length by the appointed Reporter (Mr M Croft). The Reporter considered evidence from Health Protection Scotland and the National Health Service. In addition, he also considered low frequency noise surveys undertaken by the Appellant and the Local Authority both of which demonstrated compliance with planning conditions and did not identify any problems attributable to the turbine operations; some periods with highest levels of low frequency noise were recorded when the turbines were not operating.



The Reporter concluded that:

- The literature reviews by bodies with very significant responsibilities for the health of local people found insufficient evidence to confirm a causal relationship between wind turbine noise and the type of health complaints cited by some local residents.
- The NHS's assessment is that concerns about health impact are not supported by good quality research.
- Although given the opportunity, the Community Council failed to provide evidence that can properly be set against the general tenor of the scientific evidence.

Low-frequency noise and infrasound is considered in the WSP BEIS report. The report considered a number of studies which investigated claimed links between adverse health symptoms and infrasound emissions from wind turbines. The report notes on page 116 that:

*'It has been demonstrated in controlled experiments, including the involvement of participants self-reporting to be sensitive to wind turbine infrasound, that exposure to infrasound at levels representative of wind turbine immissions at dwellings is not associated with physiological or psychological health effects, whereas the expectation of effects from being exposed to wind turbine infrasound, and positive or negative messages influencing that expectation, can affect health symptom reporting.'*

*Overall, the findings from the existing evidence base indicate that infrasound from wind turbines at typical exposure levels has no direct adverse effects on physical or mental health, and reported symptoms of ill-health are more likely to be psychogenic in origin.*

*It is expected that further evidence from ongoing studies into wind turbine infrasound effects will emerge soon, in particular from the NHMRC studies in Australia. However, based on the existing scientific evidence, it does appear probable that the above findings will not be contradicted by newer evidence.'*

Since the publication of the WSP BEIS report, the study that was granted funding by NHMRC (the National Health and Medical Research Council of Australia) was published in the Environmental Health Perspectives (EHP) journal which is published by the United States National Institute of Environmental Health. The study aimed to test the effect of exposure to 72 hours of infrasound (designed to simulate a wind turbine infrasound signature) exposure on human physiology, particularly sleep. The study concluded that:

*'Our findings did not support the idea that infrasound causes WTS. High level, but inaudible, infrasound did not appear to perturb any physiological or psychological measure tested in these study participants.'*

It is therefore not considered necessary to carry out specific assessments of low frequency noise and that it should be scoped out.

#### **11.5.4 Amplitude Modulation**

In its simplest form, Amplitude Modulation (AM), by definition, is the regular variation in noise level of a given noise source. This variation (the modulation) occurs at a specific frequency, which, in the case of wind turbines, is defined by the rotational speed of the blades, i.e. it occurs at the rate at which the blades pass a fixed point (e.g. the tower), known as Blade Passing Frequency.

A study was carried out in 2007 on behalf of the Department for Business, Enterprise and Regulatory Reform (BERR) by the University of Salford, which investigated the incidence of noise complaints associated with wind farms and whether these were associated with AM. The study defined AM as aerodynamic noise from wind turbines with a greater degree of fluctuation than normal at blade passing frequency. Its aims were to ascertain the



prevalence of AM on UK wind farm sites, to try to gain a better understanding of the likely causes, and to establish whether further research into AM is required.

The study concluded that AM had occurred at only a small number (4 of 133) of wind farms in the UK, and only for between 7% and 15% of the time. It also stated that, the causes of AM are not well understood and that prediction of the effect was not currently possible.

This research was updated in 2013 by an in-depth study undertaken by Renewable UK, which has identified that many of the previously suggested causes of AM have little or no association to the occurrence of AM in practice. The generation of AM is based upon the interaction of a number of factors, the combination and contributions of which are unique to each site. With the current state of knowledge, it is not possible to predict whether any particular site is more or less likely to give rise to AM, and the incidence of AM occurring at any particular site remains low, as identified in the University of Salford study. The report includes a sample planning condition to address AM, however that has not yet been validated or endorsed by UK Government.

In 2016, the IOA proposed a measurement technique to quantify the level of AM present in any particular sample of windfarm noise. In August 2016 a report written by WSP/Parsons Brinkerhoff was published by the Department of Business, Energy & Industrial Strategy (BEIS, formerly The Department of Energy & Climate Change). The report sought to build on the conclusions of the IOA study in order to define an appropriate assessment method for AM, including a penalty scheme and an outline planning condition.

In November 2017, an article entitled 'A planning condition for wind farms' was published in Vol 42 No 6 of the Acoustics Bulletin magazine. The article was written collaboratively by a number of noise consultants and suggested a noise planning condition which included consideration of AM. The authors noted in the article that:

*'Whilst local authorities and developers have waited for a planning condition that could be applied to newly consented wind farms, or to those already consented but with a suspensive condition, the report Wind Turbine AM Review (WTAMR) by WSP/Parsons Brinckerhoff for DECC arguably did not provide that. In addition there have been a number of comments on WTAMR that we consider should be addressed.'*

*The article then went on to propose a draft condition but noted that: 'This approach is proposed based on the current state of understanding, but may be subject to modification in light of new research and further robust information.' And 'As various people before us have discovered, the derivation of a penalty is not easy. There is not sufficient reliable research to be confident that a penalty system would always provide a fair indication of the impact of AM.'*

At the time of writing there has been no official response to those recommendations from the IOA Noise Working Group and, as yet, no endorsement from any Scottish Government Minister or Department. The recommendation to impose a planning condition and the associated penalty scheme is at odds with the advice from the IOA GPG which currently states (paragraph 7.2.10):

*'7.2.1 The evidence in relation to "Excess" or "Other" Amplitude Modulation (AM) is still developing. At the time of writing, current practice is not to assign a planning condition to deal with AM.'*

The WSP BEIS report discusses AM, and on page 119 states that:

*'At present, it seems evident that reliable predictions of AM in the context of development planning and noise assessment guidance are unlikely to be practically feasible in the near future.'*

At time of writing there is no agreed methodology which can be used to predict the occurrence of AM or an agreed methodology which can be used to determine whether the



effects of AM, should it occur, are likely to be significant. On that basis it is considered therefore that amplitude modulation should be scoped out.

## 11.6 Approach to Mitigation

A range of good practice measures will be included within the CEMP for the proposed development in order to minimise the potential noise impacts during the construction phase.

In the event that operational noise immission levels from the proposed development are predicted to exceed the derived noise limits, mitigation measures in the form of the targeted use of mode could be implemented. This usually involves restricting the rotor speed with a corresponding reduction in noise emissions and electrical power generation.

## 11.7 Questions for Consultees

The following questions are directed to consultees:

- Q11.1: Can the consultees confirm that they agree with the proposed assessment methodologies, specifically the use of ETSU-R-97 and the IOA GPG to assess operational noise and, if required, BS5228 to assess construction noise?
- Q11.2: Can consultees agree that assessment of decommissioning noise, vibration, low frequency noise, and amplitude modulation be scoped out of the EIA?

## 11.8 References and Standard Guidance

The Working Group on Noise from Wind Turbines, (1996). ETSU-R-97, the Assessment and Rating of Noise from Windfarms, Final Report for the Department of Trade & Industry.

Institute of Acoustics (2013). A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise.

Scottish Government, Planning Advice Note 1/2011: Planning and Noise

WSP. A review of noise guidance for onshore wind turbines. [Online] 01 05 2024. Report for BEIS: A review of noise guidance for onshore wind turbines | WSP.

BS 5228-1:2009 (amended 2014) 'Code of practice for noise and vibration control on construction and open sites – Part 1: Noise'



## 12.0 Site Access, Traffic and Transport

### 12.1 Introduction

This Section of the Scoping Report outlines the proposed scope of work required to assess the potential significant effects associated with Site access, traffic and transport during the construction and operational phases of the proposed development.

Potentially significant traffic related environmental effects may result during construction from:

- The transportation of turbine components as Abnormal Indivisible Loads (AIL); and
- The import of construction materials transported by Heavy Goods vehicles (HGVs) and low loaders.

These are likely to impact on road users as well as pedestrians and cyclists on the existing pedestrian/cycle networks.

### 12.2 Environmental Baseline and Potential Sources of Impact

At the time of preparation of this report, the proposed route for access to the Site during construction and operational stages, and the location of cable routes for the proposed development, have not been confirmed. However, the study area for assessment will comprise the public road network likely to be utilised for traffic generated by the proposed development. This study area includes the port of Grangemouth, the M9, A872 and B818 as well as any minor connecting links.

Central Dock Road is a private road link connecting the public road network in Grangemouth to the dock. It is a two-way single carriageway road subject to a 20mph speed limit.

The M9 is a motorway on the Scottish trunk road network which connects Edinburgh in the south to Dunblane in the north, passing Grangemouth and Stirling.

The A904 connects the Forth Road Bridge north east of Edinburgh, to Falkirk. This links the docks in Grangemouth with the M9 at junction 6. The A904 routes through industrial estates on either side of the road within Grangemouth.

The A872 connects south Stirling to the A803 in Bonnybridge, and links to junction 9 of the M9 on the route between the Site and Grangemouth. Within Denny the A872 is bounded by residential properties on either side with on-street parking evident.

The B818 connects Denny in the west to the A875 in the east, itself providing links to the A811. Much of the length of this route is rural and single track with soft verges, with sections of narrow two-way single-carriageway. Surfaced passing places are available.

Traffic data will be obtained so that existing traffic flows and vehicle classification for the M9, A904, A872, B818, and Central Dock Road can be quantified, to inform the baseline situation. An Automatic Traffic Counter (ATC) will be placed on the B818 south of the Site as well as on the A872 and Central Dock Road, and data will be obtained from the Department for Transport (DfT) traffic counters also along the M9 (DfT count points 30703, 74400, 77119) and the A904 (DfT count point 40965).

#### 12.2.1 Scope of Study and Study Area

The assessment is required to evaluate the potential effects of the proposed development, and to determine the scale of the impacts on the identified sensitive receptors. For the construction of the wind farm and haul route, the main receptors deemed sensitive to increased traffic levels would likely include the A872 in Denny, and the B818 adjacent to Strathcarron Hospice. All sensitive receptors will be confirmed during a Site visit.



It is anticipated that the largest items to be delivered to the Site would be the Wind Turbine Components (WTC), along with any substation elements. It is assumed herein that the route assessment work already completed is sufficient for assessment purposes and no further detailed route assessment work is required. The Abnormal Load Route Assessment (ALRA) will be undertaken and would typically focus on ensuring the WTCs can be feasibly transported to Site, while the EIA Report will consider the impacts associated with the transport of all construction materials, structures, and plan required during construction of each element of the proposed development. Whilst the access arrangements have not been confirmed for the Site, it is assumed access will most likely be gained from a feasible location with the B818. The assessment will therefore consider impacts to this road and the wider transport network.

## **12.2.2 Baseline Conditions including Field Studies**

The Site Access, Traffic and Transport chapter of the EIA Report will include a detailed evaluation of the baseline conditions and will focus on assessing the potential impacts to arise during the construction phase for each element of the proposed development.

### **12.2.2.1 Desk Study**

The following data collection and analysis will be undertaken:

- A Site visit to confirm the study area and possible sensitive receptors;
- A full review of any route survey work done previously including the ALRA;
- A review of available nearby development application documents;
- Analysis of traffic count data (including data from DfT traffic counters and from commissioned ATCs along the B818, A872, M9, A904 and Central Dock Road) and collision data;
- Assessment of traffic impacts of previous and committed local developments to understand identified effects;
- Compilation of data on the number of construction vehicles and staff numbers related to each phase of the construction likely to be present on the local road network during the construction phase;
- A review of height and weight restrictions along the proposed construction transport routes; and
- Access design and swept path analysis of the identified access options.

### **12.2.2.2 Field Surveys**

Following a detailed review of the route assessment, further consultation is expected to be undertaken to refine access proposals. A Site visit will include a visual inspection of the preferred route to corroborate any constraints or issues flagged in the ALRA and identify any other likely issues where they may exist. In addition, the Site access location and receptors sensitive to traffic level changes within the study area will also be considered as part of the Site visit.

Traffic surveys will be commissioned in order to provide a baseline situation for traffic flows, movements, and speeds. ATCs on the A818, A872 and Central Dock Road will be commissioned to collect data across a 24-hour day across a seven-day continuous period during a neutral period. The traffic data collected will provide classified and directional flow data. Speeds will also be recorded in order to determine the 85th percentile speeds. Should a traffic count be unable/unacceptable for commissioning, Stirling Council and any relevant existing data source will be consulted for existing traffic data along the delivery route. As





access proposals crystallise, further ATC points will be considered in consultation with Stirling Council.

Publicly available DfT traffic surveys will be utilised to determine baseline traffic flows on the A904 and the M9.

### 12.2.3 Potential Sources of Impact

The potential sources of impact have been identified to occur predominantly during the construction phase of the proposed development.

It is proposed that the operational phase will be scoped out of the assessment as any traffic generated during this phase will be far lower than that generated during construction, and limited to irregular maintenance trips, undertaken by car or van type vehicles.

In summary, the main potential sources of impact are likely to relate to the impact of construction traffic on the residential areas along the network route.

#### 12.2.3.1 Construction Phase

The construction phase is likely to create the greatest traffic related environmental impacts. This is due to the number of HGVs and Light Goods Vehicles (LGVs) required to transport all the materials and deliveries to Site. To ensure that the possible maximum traffic generation is assessed, it will be assumed that all aggregate material is imported from offsite locations.

There would be traffic impacts associated with the proposed development on communities and roads along the delivery routes.

#### 12.2.3.2 Operational Phase

Once the proposed development is operational, there would be traffic/transport-related impacts caused by occasional staff movements required for maintenance purposes. It is expected that these numbers would be very low in comparison to the traffic levels to be assessed for the construction phase, and so traffic generation associated with the operation of the wind farm will not be described within the EIA Report. This element will therefore be scoped out.

## 12.3 Method of Assessment and Reporting

The assessment will first calculate the traffic generation associated with the construction phase. This will include an abridged construction works programme, details of vehicle types and sizes to be used during the construction phase, and an estimate of the number of trips anticipated to be generated by HGVs, LGVs and light vehicles.

Specifically, the assessment will include the following:

- A review of the construction programme to confirm the key traffic generating activities;
- A compilation of data on the number of daily vehicle trips to be present on the roads within the study area, and identification of the likely maximum or worst case scenario;
- A review of the ALRA and an assessment of the possible impacts associated with the transport of abnormal loads;
- A comparison between likely traffic flows on potentially affected roads against the baseline situation for a future year scenario with and without the proposed development, reported as percentage increases; and
- Identification of the impacts.





Mitigation measures to alleviate the known local traffic issues arising from the construction traffic will be identified, with the aim of reducing the effect of the vehicle movements identified.

The Institute of Environmental Management and Assessment (IEMA) guidance (2023) would form the basis for which the effects of traffic during the construction phase would be assessed. The guidelines are intended for the assessment of environmental effects of road traffic associated with major new developments, as opposed to short-term construction. However, in the absence of alternative guidance, and as the traffic generation during the operation and maintenance phase is very low, these guidelines have been applied to assess the short-term construction phase of the proposed development.

Based on the IEMA guidance, the factors identified as being the most discernible potential environmental effects likely to arise from changes in traffic movements have been set out below. These would be considered in the assessment as potential effects which may arise from changes in traffic flows from the proposed development.

- **Severance of communities** – severance is the perceived division that can occur within a community when it becomes separated by major transport infrastructure separation of people from places and other people.
- **Road vehicle driver and passenger delay** – traffic delays to non-development traffic which may occur at various locations depending on the type and scale of development.
- **Pedestrian and non-motorised user delay** – possible delays and increased severance to non-motorised users of the roads affected, predominantly related to the crossing of roads.
- **Non-motorised user amenity** – the impact to the ‘pleasantness’ of a journey, taking into account pedestrian fear and intimidation.
- **Road user and pedestrian safety** – the potential effect on road users, but in particular vulnerable users of the road (e.g. pedestrians/cyclists); and
- **Hazardous/large loads** – the potential effect on road users and local residents caused by an increase to the number of hazardous and large loads, to include the movement of AILs.

The IEMA guidelines provide two thresholds when considering predicted increase in traffic, whereby a full assessment is required:

- Include road links where traffic flows are predicted to increase by more than 30% (or where the number of heavy goods vehicles is predicted to increase by more than 30%); and
- Include any other specifically sensitive areas where traffic flows are predicted to increase by 10% or more.

Where the predicted increase in traffic flow from the proposed development is lower than these thresholds, the significance of the effects can be considered to be low and not significant in EIA terms, and no further assessments are required.

Where the traffic associated with the proposed development will result in the above thresholds being exceeded, further assessment will be completed to identify the magnitude and significance of any resulting effects.

The potential sensitivity of the receptors to changes in traffic levels would be determined by considering the study area and presence of receptors in relation to each potential impact. The receptors would be assessed individually to determine its sensitivity and the assessment criteria is set out in **Table 12-1**.



**Table 12-1: Transport and Access Receptor Sensitivity**

Receptor sensitivity	Definition
Very high	Receptor with no capacity to accommodate a particular effect and no ability to recover or adapt.
High	Receptor with very low capacity to accommodate a particular effect with low ability to recover or adapt.
Moderate	Receptor with low capacity to accommodate a particular effect with low ability to recover or adapt.
Low	Receptor has some tolerance to accommodate a particular effect or will be able to recover or adapt.
Negligible	Receptor is generally tolerant and can accommodate a particular effect without the need to recover or adapt.

**Table 12-2: Transport and Access Magnitude Criteria**

Magnitude	Criteria
Large	Impact occurs over a large spatial extent resulting in widespread, long term or permanent changes in baseline conditions, or affecting a large proportion of receptor population. The impact is very likely to occur and /or will occur at a high frequency or intensity.
Medium	Impact occurs over a local to medium extent, with short to medium term change to baseline conditions, or affecting a moderate proportion of receptor population. The impact is likely to occur and/ or will occur at a moderate frequency or intensity.
Small	Impact is localised and temporary or short term, leading to detectable change in baseline conditions, or noticeable effect on small proportion of receptor population. The impact is unlikely to occur or may occur but at low frequency or intensity.
Negligible	Impact is highly localised and short term with full rapid recovery expected to result in very slight or imperceptible changes to baseline conditions, or receptor population. The impact is very unlikely to occur and if it does will occur at very low frequency or intensity.
No Change	No change from baseline conditions.
Positive	Where the proposals result in an improvement to baseline conditions.

The magnitude of an impact is based on a variety of parameters. The definitions provided in **Table 12-2** are for guidance only and may not be appropriate for all impacts. For example, an impact may occur in a very localised area but at very high frequency / intensity for a long period of time. In such cases expert judgement is used to determine the most appropriate magnitude ranking and this is explained through the narrative of the assessment.

Sensitivity and magnitude of change as assessed under the criteria detailed above would then be considered collectively to determine the significance of effect, as described in **Table 12-3**. The collective assessment is based on the likely sensitivity of the receptor to the change (e.g. is a receptor present which would be affected by the change), and then the magnitude of that change. Effects of 'major' and 'moderate' significance are 'significant' in terms of the EIA Regulations.



**Table 12-3: Transport and Access Significance of Effects**

Significance	Conditions of Significance
Major	Where the magnitude of the impact is Large and the receptor has no ability to accommodate the change. Permanent mitigation measures may be required.
Moderate	Where the magnitude of the impact is Medium or for higher magnitudes the receptor has a limited ability to accommodate the change. Short term mitigation may be required.
Slight	Where the magnitude is Small or, for higher magnitudes, the receptor has the ability to accommodate the change. No mitigation measures are required.
Negligible	Where the magnitude of the impact is Negligible. No mitigation measures are required.

### 12.3.1 Cumulative Impacts

The cumulative impacts from any other local permitted developments will be a key consideration for the assessment, particularly in relation to the control of construction traffic in the local area. The cumulative assessment will focus on the construction phase as this would be the most likely period to create significant effects should construction phases overlap or occur sequentially amongst permitted developments.

The traffic assessment and draft traffic management plans will be reviewed for the other major developments identified to be of direct relevance and on a similar construction timeline to the proposed development. The proposed construction timescales for these developments would be carefully considered with those identified to have no impacts within the study area removed from the cumulative assessment. Such sites will be identified and discussed with Stirling Council.

## 12.4 Consultation

The scope of the study and assessment for the proposed development in relation to access, traffic and transport will seek to identify potential impacts which may result from the construction of the proposed development. Consultation with stakeholders will be completed through the scoping process.

The proposed development will be discussed with the following prescribed bodies and key stakeholders/organisations:

- Stirling Council – consultation to discuss the potential impacts of the proposed development on the local road network and cumulative traffic effects;
- Transport Scotland as the strategic roads authority; and
- The relevant ports authority.

## 12.5 Matters Scoped Out

Due to any environmental effects which would occur during the decommissioning phase of the proposed development likely to be similar to, or less than, those effects during the construction phase, it is proposed that decommissioning effects are scoped out of the Site Access, Traffic and Transport assessment for the EIA of the proposed development.



It is proposed that the operational effects are scoped out of the Site Access, Traffic and Transport assessment for the EIA of the proposed development for the same reasons as the decommissioning phase.

ALLs would be considered in more detail within a separately submitted ALRA; the findings and recommendations from the report will be discussed within the Site Access, Traffic and Transport Chapter of the EIA Report with any impacts identified and assessed as required.

## 12.6 Approach to Mitigation

Mitigation measures will be proposed following the completion of the impact assessments, as informed by the baseline. The purpose of these measures is to aim to remove, minimise, or compensate any significant effects. These mitigation measures will be agreed with Stirling Council and Transport Scotland.

## 12.7 Questions for Consultees

The following questions are directed to consultees:

- Q12.1: Confirmation of agreement with regards the scope of the proposed assessment, including those elements proposed to be scoped out?
- Q12.2: Confirmation that traffic survey as discussed above would be appropriate?
- Q12.3: Confirmation that the use of DfT data for obtaining traffic flow data on the A872, A904 and M9 is acceptable?
- Q12.4: Confirmation of any committed developments to be taken into account within the cumulative assessment?

## 12.8 References and Standard Guidance

National Planning Framework 4 (Scottish Government, 2023);

Planning Advice Note (PAN) 75;

Institute of Highways and Transportation (IHT) publication 'Guidelines for Traffic Impact Assessment';

Transport Scotland's Transport Assessment Guidance (2012);

'Environmental Assessment of Traffic and Movement' Guidelines (2023) for the IEMA;

Stirling Local Transport Strategy (2017-2027);

Tayside and Central Scotland Transport Partnership (Tectran) Regional Transport Strategy (2008-2023);

Tayside and Central Scotland Transport Partnership (Tectran) Regional Transport Strategy Final Draft January 2024 (2024-2034); and

DfT 'Design Manual for Roads and Bridges' (DMRB).



## 13.0 Aviation

### 13.1 Introduction

This Section assesses the potential for the proposed development to affect aviation communications, navigation and surveillance infrastructure in the vicinity of the Site. The Section identifies the potential significant effects that the proposed development may have on civilian and military aviation and agrees the methodology for their assessment. The following are considered:

- Civil aviation interests, including 'En Route' facilities managed and operated by National Air Traffic Services (En Route) Ltd (NERL), airports, licensed and unlicensed aerodromes, light aircraft landing strips, microlight sites, parachute and gliding sites; and
- Military facilities including Ministry of Defence (MoD) Airfields and military Air Traffic Control (ATC) facilities, Air Defence Radars (ADR), Danger Areas and Ranges and low flying operations.

### 13.2 Legislation, Planning Policy and Guidance

The proposed development will continue to be assessed against existing national policy and guidance and will be based upon the guidance laid down in Civil Aviation Authority (CAA) Publication (CAP) 764, Policy and Guidelines on Wind Turbines. Since there are many issues that need to be considered when assessing the potential impact of proposed developments, the local Air Navigation and Air Traffic Services Providers (ANSPs) are best placed to provide expert interpretation of what those impacts might be and how they might affect safety, efficiency and flexibility of their operations. There is a well-established regulatory and policy framework that has been in force for a number of years, but which has been the subject of constant amendment and updating, and there are a number of regulatory and guidance documents that have been taken into account and complied with in the preparation of this assessment.

### 13.3 Environmental Baseline and Potential Sources of Impact

The Site is in Class G (or uncontrolled) airspace underneath some of the most complex airspace in the UK, in an area known as the Scottish Terminal Manoeuvring Area (TMA), designed for the protection of civil air traffic operating from Edinburgh, Glasgow and Prestwick airports.

The development of wind turbines has the potential to cause a variety of adverse effects on aviation during turbine operation. These include (but are not limited to): physical obstructions, the generation of unwanted returns on Primary Surveillance Radar (PSR) and adverse effects on the overall performance of Communications, Navigation and Surveillance (CNS) equipment. The aviation Study Area and assessment has been determined by, and is dependent on, the maximum operating ranges of each of the radar systems scoped into the assessment. The operational range of the radar system is dependent on the function of the radar, the operational requirement of the radar and on the type of radar used. The ranges of those radars and, subsequently, the topic-specific Study Area will vary depending on the technical specification of each radar system and, possibly, between different installations of the same system. The same factors apply to other aviation infrastructure (radios/beacons). CAP 764 provides criteria for initial guidance in assessing whether any wind turbine development might have an impact on civil aerodrome related operations.



Taken collectively the reference and guidance sources establish that:

- Officially safeguarded aerodromes and aerodromes with a surveillance radar facility need to be consulted if the proposed wind turbines are within 30km;
- Within airspace coincidental with any published Instrument Flight Procedure (IFP) to take into account the aerodrome's requirement to protect its IFPs;
- Consultation with the operators of officially safeguarded technical sites is required if the proposed wind turbines are within 10km; and
- Further assessment and/or consultation will be required if turbines are planned within:
  - 17km of a licensed aerodrome within a runway of 1100m or more;
  - 5km of a licensed aerodrome with a runway of less than 1100m;
  - 4km of an unlicensed aerodrome with a runway of more than 800m; and/or
  - 3km of an unlicensed aerodrome with a runway of less than 800m.

CAP 764 goes on to state that these distances are for guidance purposes only and do not represent the radar/safeguarding range beyond which all wind turbine developments will be approved or within which they will always be objected to. These quoted ranges are intended as a prompt for further discussion between developers and aviation stakeholders.

It is also necessary to consider the operations of the Ministry of Defence including:

- Ministry of Defence Airfields (radar and non-radar equipped);
- Ministry of Defence Remote Air Traffic Control Radars;
- Ministry of Defence Air Defence Radars;
- Ministry of Defence Low Flying; and
- Ministry of Defence Meteorological Radars.

The Ministry of Defence does not stipulate consultation distances for their radars.

It will also be necessary to take into account the possible effects of wind turbines upon the National Air Traffic Services (NATS) radar systems – a network of primary and secondary radars and navigation facilities around the country.

## 13.4 Method of Assessment and Reporting

The aviation Study Area and assessment has been determined by, and is dependent on, the maximum operating ranges of each of the radar systems scoped into the assessment. The operational range of the radar system is dependent on the function of the radar, the operational requirement of the radar and on the type of radar used. The ranges of those radars and, subsequently, the topic-specific Study Area will vary depending on the technical specification of each radar system and, possibly, between different installations of the same system. The same factors apply to other aviation infrastructure (radios/beacons). CAP 764 provides criteria for initial guidance in assessing whether any wind turbine development might have an impact on civil aerodrome related operations.

Radar modelling has been undertaken using specialist propagation prediction software (RView) which has been designed and refined specifically for the task. RView uses a comprehensive systems database which incorporates the safeguarding criteria for a wide range of radar and radio navigation systems and models terrain using the Ordnance Survey (OS) Landform Panorama digital terrain model, which has a post spacing of 50 metres and has a root mean square (RMS) error of 3 metres. The results are verified using the Shuttle





Radar Topography Mission (SRTM) dataset, a separate smoothed digital terrain model with data spacing of 3 arc seconds. By using two separate and independently generated digital terrain models, anomalies are identified and consistent results assured. RView models the refractive effects of the atmosphere on radio waves and the First Fresnel Zone. RView can perform calculations using the true Earth Radius at the midpoint between the radar and the wind turbine or the simplified 4/3 Earth Radius model. If needed, RView is also capable of modelling a range of atmospheric refractive conditions and models the trajectory of radar signals at different elevations permitting the modelling of both volume surveillance and pencil beam radars as well as the effects of angular sterilisation as applied, for example, in Met Office radars.

### 13.5 Consultation

Consultation has begun with the Met Office on mitigation of the potential effects on the Holehead met radar.

There are no MoD ATC or Air Defence radars likely to be affected by the proposed development. This will be confirmed with MoD DIO during consultation and reported in the EIA. DIO will also be consulted regarding any likely low flying implications and this will be reported within the EIA Report.

It will be necessary to consult with NATS on the radars utilised within the Multi-Radar Tracking System covering the Scottish TMA; this will be reported within the EIA Report.

Glasgow and Edinburgh Airports will be consulted regarding any possible impact on their operations; this will be reported within the EIA Report.

### 13.6 Matters Scoped Out

Construction - Algorithms within radar systems are established to prevent static objects being detected and to ensure that only moving objects are presented to the controllers' screens. During the construction phase the blades will be static and will not be detected. There should be no interference with radar systems.

There is a well-established procedure for the dissemination of information relating to construction and considered essential for the safety of flying operations, both civil and military, to allow such aviation operations to be planned and to continue accordingly. The construction activities, when conducted in accordance with mandated procedure, will not pose a risk to aviation and there should be no effect; the inherent embedded mitigation means that construction activities can be scoped out from further consideration with aviation.

Decommissioning - There is a well-established procedure for the dissemination of information relating to de-construction and considered essential for the safety of flying operations, both civil and military, to allow such aviation operations to be planned and to continue accordingly. The decommissioning activities, when conducted in accordance with mandated procedure, will not pose a risk to aviation and there should be no effect; the inherent embedded mitigation means that de-construction activities can be scoped out from further consideration with aviation.

There are no non-radar equipped licensed aerodromes within the recommended consultation distance and these can be scoped out from further consideration.

There are no unlicensed aerodromes, hang-gliding sites or glider sites within the stipulated consultation distances and these can be scoped out from further consideration.

### 13.7 Approach to Mitigation

The suitability of any mitigation will be a matter for the affected stakeholders. These will be identified and reported within the EIA Report.





## 13.8 Questions for Consultees

The following questions are directed to consultees:

- Q13.1: Is the extent of envisaged scoping (including confirmation on elements proposed to be scoped out) considered appropriate?
- Q13.2: Is there any other aviation stakeholder that could/should be consulted?

## 13.9 References and Standard Guidance

Civil Aviation Publication (CAP) 764 Civil Aviation Authority (CAA) Policy and Guidance on Wind Turbines.

CAP 774 UK Flight Information Services.

CAP 168 Licensing of Aerodromes.

CAP 493 Manual of Air Traffic Services Part 1.

CAP 670 Air Traffic Services Safety Requirements.

CAP 774 UK Flight Information Services.

CAP 738 Safeguarding of Aerodromes.

CAP 793 Safe Operating Practices at Unlicensed Aerodromes.

CAA Policy Statement of Lighting of Onshore Wind Turbine Generators.

Military Aviation Authority Traffic Management (3000 series) Instructions.

Military Aviation Authority Regulatory Article 2330 (Low Flying).

UK Military Aeronautical Information Publication (MIL AIP).

UK Aeronautical Information Publications (AIP).

CAA 1:250,000 and 1:500,000 VFR Charts.



## 14.0 Socio-Economics, Recreation and Land Use

### 14.1 Introduction

BiGGAR Economics has been commissioned to undertake the socio-economic, tourism and recreation elements of the proposed development. Socio-economic and tourism assessments of onshore wind farms over the last decade have found no adverse effects assessed as significant in terms of the EIA regulations and there is no reason to expect significant effects for the proposed development. It is therefore proposed to scope socio-economics and tourism out of the EIA Report.

Nevertheless, it is recognised that socio-economic and tourism issues will be of interest to stakeholders and local authorities and so a separate report on socio-economics and tourism will be provided and submitted alongside the EIA Report. This will include consideration of local tourism activity, direct effects such as employment generation and any indirect or induced effects from the proposed development. The report will also consider whether the proposed development maximises net economic benefit, in the context of Policy 11c of NPF4.

This section describes what will be considered in the separate socio-economic and tourism report and the approach that will be taken.

### 14.2 Environmental Baseline and Potential Sources of Impact

#### 14.2.1 Study Areas

The study areas that will be used in this assessment are made from pre-defined administrative geographies. The Site boundary falls within the local authority areas of Stirling Council. The study areas are based on the Site boundary.

A Local Area has been defined using the electoral ward of Stirling West, where the proposed development will be located. The Site boundary also borders the Forth and Endrick electoral ward within Stirling Council. The Site boundary also lies within 5km of the local authority areas of Falkirk, East Dunbartonshire and North Lanarkshire. A wider region comprising the four local authority areas has also been assessed as the proximity of each of the local authority areas to the proposed development is likely to impact the wider region beyond just Stirling.

The baseline description will cover and compare the following study areas:

- The Local Area (comprised of the electoral wards of Forth and Endrick and Stirling West);
- Stirling;
- the Wider Region (comprised of the local authority areas of Stirling; Falkirk, East Dunbartonshire and North Lanarkshire); and
- Scotland.

Economic impacts will be assessed for the study areas of:

- Stirling;
- The Wider Region; and
- Scotland.

Tourist attractions and accommodation providers will be identified within 15km of the Site boundary – also some in other local authority areas.



## 14.2.2 Environmental Baseline

The baseline assessment will include a description of the current socio-economic, recreation and tourism baseline within the Local Area and other study areas. Specifically, the baseline study will cover;

- The demographic profile of the Local Area within the context of the regional and national demographic trends;
- Employment and economic activity of the regional economy compared to the national level;
- The industrial structure of the Local Area within the context of regional and national economies;
- Wage levels within the regional economy compared to the national level; and
- The role of the tourism sector in the Local Area and regional economy, with consideration of assets, including accommodation providers and public paths, in the immediate vicinity of the proposed development.

### 14.2.2.1 Population Estimates

The current data indicates that the Local Area has a population of 26,170, which accounts for 28% of the total population of the Stirling<sup>38</sup>.

The Local Area has an older population (see **Table 14-1**), with 23% of the population aged 65 or over. In comparison, 20% of the Scottish population is aged 65 or over. Similarly, 60% of the population in the Local Area are aged between 16-64, compared to 64% of the Scottish population.

**Table 14-1: Population Estimates by Age, 2022**

	Local Area	Stirling	Wider Area	Scotland
Total Population	26,170	93,500	704,500	5,479,900
% under 16	17%	16%	18%	17%
% age 16 - 64	60%	64%	63%	64%
% aged 65 and over	23%	20%	19%	20%

### 14.2.2.2 Population Projections

The Office for National Statistics provides population projections at a local authority and Scottish level<sup>39</sup>. While information is not available at the electoral ward level, current population estimates and future trends at local authority level can be used to form a view of more localised trends.

The total population of Stirling is projected to increase from 93,500 to 104,273 between 2022 and 2043. This is an increase of 12%. During the same period, the population of Scotland is projected to increase by 2%.

<sup>38</sup> National Records of Scotland (2024) Electoral Ward Population Estimates by Sex and Single year of Age. Available at: <https://www.nrscotland.gov.uk/statistics-and-data/statistics/statistics-by-theme/population/population-estimates/2011-based-special-area-population-estimates/electoral-ward-population-estimates>

<sup>39</sup> ONS (2023) Population Projections -local authority based by single year of age. Available at <https://www.nomisweb.co.uk/datasets/ppsyoala>



Stirling is also projected to experience an ageing population, with the share of the population aged 65 and over is projected to increase from 20% to 24%. Despite a fall in population share, the absolute number of working age population of Stirling is also expected to increase by approximately 3,500. See **Table 14-2** for detail.

**Table 14-2: Population Projections by Age, 2022**

	Stirling		Wider Region		Scotland	
	2022	2043	2022	2043	2022	2043
Total Population	93,500	104,273	705,500	727,937	5,479,900	5,574,819
% under 16	16%	15%	18%	16%	17%	15%
% age 16 - 64	64%	61%	63%	59%	64%	60%
% aged 65 and over	20%	24%	19%	25%	20%	25%

### 14.2.2.3 Economic Activity

The economic activity rate in Stirling is higher than that of Scotland as a whole, with 81% of the population aged between 16 and 64 either in employment or looking for work<sup>40</sup>. The unemployment rate in Stirling (4%) was above the Scottish average (3%). The median annual gross wage was higher for residents of Stirling (£30,774) than for residents of Scotland (£29,842). See **Table 14-3** for detail.

**Table 14-3: Economic Activity, 2023**

	Stirling	Wider Area	Scotland
Economic Activity Rate	81%	76%	78%
Unemployment Rate	4%	3%	3%
Median Annual Gross Income (All Residents)	£30,774	£30,984	£29,842

### 14.2.2.4 Industrial Structure

As shown in the table below, the human health and social work activities sector is particularly important to the Local Area, accounting for 28% of all jobs in the area. This is higher than that of Stirling (10%) and Scotland (15%). There are two hospitals within the Stirling West electoral ward.

Employment in accommodation and food service activities accounts for a higher proportion of jobs in the Local Area (12%) than in Stirling (10%) and Scotland (8%). This indicates the importance of tourism to the economy of the Local Area.

The economic opportunities from the development, construction and operation of the proposed development are likely to be within specific sectors. These include construction and professional, scientific and technical services. The construction sector accounts for 4% of jobs in the Local Area, which is lower than that of Stirling (6%) and Scotland (6%). The construction sector is more important within the wider region where it accounts for 9% of jobs. There is a similar share of people employed in professional, scientific and technical activities in the Local Area than in Scotland as a whole. See **Table 14-4** for detail.

<sup>40</sup> ONS (2024) Labour market Profile – Stirling. Available at: <https://www.nomisweb.co.uk/reports/lmp/la/1946157434/report.aspx?town=Stirling>



**Table 14-4: Industrial Structure, 2022**

	Local Area	Stirling	Wider Area	Scotland
Human health and social work activities	28%	10%	16%	15%
Accommodation and food service activities	12%	10%	7%	8%
Public administration and defence; compulsory social security	11%	6%	8%	6%
Education	9%	10%	7%	8%
Administrative and support service activities	7%	10%	8%	8%
Wholesale and retail trade; repair of motor vehicles and motorcycles	7%	14%	14%	13%
Professional, scientific and technical activities	7%	7%	5%	7%
Construction	4%	6%	9%	6%
Manufacturing	3%	5%	8%	7%
Agriculture, forestry and fishing	2%	4%	1%	3%
Arts, entertainment and recreation	2%	4%	3%	3%
Information and communication	2%	5%	2%	3%
Real estate activities	2%	2%	1%	1%
Other service activities	2%	1%	2%	2%
Financial and insurance activities	1%	3%	1%	3%
Transportation and storage	1%	2%	6%	4%
Water supply; sewerage, waste management and remediation activities	0%	1%	1%	1%
Mining and quarrying	0%	0%	0%	1%
Electricity, gas, steam and air conditioning supply	0%	0%	1%	1%

#### 14.2.2.5 Education

The population in Stirling has a higher level of education than that of the wider Scottish population<sup>41</sup>. More individuals hold NVQ3 and NVQ4 qualifications or above, which are equivalent to Highers and undergraduate degrees from university, respectively. In Stirling,

<sup>41</sup> ONS (2024) Labour market Profile – Stirling. Available at: <https://www.nomisweb.co.uk/reports/lmp/la/1946157434/report.aspx?town=Stirling>



5% of the working-age population have no qualifications, less than that of Scotland (8%). See **Table 14-5** for detail.

**Table 14-5: Education Levels, 2022**

	Stirling	Wider Region	Scotland
% with NVQ4+	55%	45%	50%
% with NVQ3+	72%	60%	65%
% with NVQ2+	85%	74%	80%
% with NVQ1+	90%	81%	86%
% with other qualifications (NVQ)	5%	6%	6%
% with no qualifications (NVQ)	5%	13%	8%

### 14.2.3 Potential Sources of Impact

The impacts that will be considered in this assessment will include the potential socio-economic, tourism and recreation impacts associated with the proposed development.

An economic impact analysis will be undertaken using the methodology developed by BiGGAR Economics; which has been used to assess over 150 onshore wind farms across the UK. The potential socio-economic impacts that will be considered are:

- Temporary effects on the regional and/or national economy due to expenditure during the construction phase;
- Permanent effects on the regional and/or national economy due to expenditure associated with the ongoing operation and maintenance of the proposed development;
- Permanent effects as a result of any additional public expenditure that could be supported by the additional tax revenue that would be generated by the development during the operational phase;
- Permanent effects on the local economy that could be supported by any community funding and/or shared ownership proposals during the operational phase of the development; and
- The link between onshore wind energy developments and the tourism sector has been a subject of debate. However, the most recent research has not found a link between tourism employment, visitor numbers and onshore wind development.

In 2021 this study was updated, and research identified 16 wind farms with a capacity of at least 10 megawatts that became operational between 2015 and 2019. Analysis of trends in tourism employment in the locality of these wind farms (15km radius) found that 11 of the 16 areas had experienced more growth in tourism employment than for Scotland as a whole. For 13 of the 16 wind farms, trends in tourism employment in the locality had outperformed the local authority in which they were based. This work reflected an update of previous work undertaken by BiGGAR Economics in 2017 that considered 28 wind farms constructed between 2009 and 2015 and the trends in tourism employment in the areas local to these developments. The analysis found that there was no relationship between the development of onshore wind farms and tourism employment at the level of the Scottish economy, at the local authority level nor in the areas immediately surrounding wind farm developments.



Nevertheless, the tourism sector is an important contributor to the Scottish economy, and so there is merit in considering whether the development will have any effect on the tourism sector. Therefore, while it is proposed to scope this topic out of the EIA, an assessment will be carried out and included as a separate, standalone report, as part of the suite of submission documents. This assessment will consider the potential effects that the development could have on tourism attractions, routes, trail, and local accommodation providers. This will consider the implications of any effects identified for the tourism sector in the Local Area and wider region.

## 14.3 Method of Assessment and Reporting

### 14.3.1 Guidance and Legislation

There is no specific legislation or guidance on the methods that should be used to assess the socio-economic impacts of a proposed onshore wind farm development. The proposed method has however been based on established best practice, including that used in the UK Government and industry reports on the sector. In particular, this assessment will draw from two studies by BiGGAR Economics on the UK onshore wind energy sector: a report published by RenewableUK and the Department for Energy and Climate Change (DECC) in 2012 on the direct and wider economic benefits of the onshore wind sector to the UK economy and a subsequent update to this report published by RenewableUK in 2015.

There is also no formal legislation or guidance on the methods that should be used to assess the effects that wind farm developments may have on general tourism and recreation interests. The proposed method will consider specific attractions or tourism facilities to assess if there could be any effects from the development.

For recreational assets, guidance has been provided by NatureScot on how to assess effects on recreational amenity and the approach outlined has been used. This takes into consideration a number of potential effects, including direct effect on facilities, such as limitation or restrictions on access, and effects on the intrinsic quality of the resources enjoyed by people. In general, this guidance would consider recreational and access impacts to potentially be significant if:

- Permanent or long-term effects on the resources on which enjoyment of the natural heritage depends, in particular where facilities have been provided by SNH or others under statutory powers;
- Permanent or long-term change that would affect the integrity and long-term sustainable management of facilities which were provided by SNH or others under statutory powers;
- Where there are recreational resources for open air recreation pursuits affected by the proposal which have more than local use or importance, especially if that importance is national in significance;
- Major constraints on or improvements for access or accessibility to designated natural heritage sites; and
- Where mitigation and/or compensatory or alternative recreational provision is considered to be inadequate.

It is also important that the socio-economic and tourism assessment takes account of the relevant local and national policy objectives. The most relevant objectives for this are expected to be included in the following strategies:

- Scottish Government (2022), Scotland's National Strategy for Economic Transformation;





- Scottish Government (2023), Scotland's National Performance Framework;
- Scottish Government (2021), Local Energy Policy Statement;
- Scottish Government (2022), Onshore Wind Policy Statement;
- Scottish Government (2023), Onshore Wind Sector Deal;
- EDAS (2023), Implementing Community Wealth Building, A Guide
- Stirling Council (2022), Stirling's Economic Strategy 2022 - 2030; and
- Scottish Tourism Alliance (2021), Scotland Outlook 2030.

It is also essential to take into consideration for the assessment the fourth National Planning Framework (NPF4), the national spatial strategy for Scotland. The document considers:

- Scotland's spatial principles;
- National planning policy;
- National developments; and
- Regional priorities.

In the context of energy generation, Policy 11 is relevant to the socio-economic impact of the proposed development. Paragraph (c) states that *“development proposals will only be supported where they maximise net economic impact, including local and community socio-economic benefits such as employment, associated business and supply chain opportunities”*. The analysis will reach the conclusion on whether the project maximises the net economic impact in the context of this NPF4 Policy 11(c).

Paragraph (d) of Policy 11 sets out a number of impacts that should be addressed during project design and mitigation. That list does not include tourism.

In addition, Policy 25 states that *“Development proposals which contribute to local or regional community wealth building strategies and are consistent with local economic priorities will be supported”*. The stand alone report will also consider how this development will contribute to community wealth in the Local Area.

Whilst NPF4 includes no requirement to consider tourism when considering net economic impact or in the project design and mitigation process, relevant employment statistics show that in Local Area employment in the sustainable tourism sector accounts for a higher percentage of total employment in the Local Area (12%) compared to both Stirling (10%) and Scotland (8%). This indicates the importance of tourism in the Local Area surrounding the proposed development and it is recognised that local stakeholders may be interested in the potential impact. Thus, a tourism assessment will be included in the socio-economic report.

### 14.3.2 Assessment Methodology

It is anticipated that the contents of the standalone report will include:

- Introduction, including scope of assessment and methodology;
- Economic development and tourism strategic context;
- Baseline socio-economic context;
- Baseline tourism and recreation context;
- Socio-economic assessment;
- Tourism and recreation impact assessment;



- Proposed measures and actions to maximise local economic and community impacts;
- Proposed measures and actions to mitigate any harmful effects (if required); and
- Summary of findings and conclusion.

This will primarily be a desk-based study with consultation undertaken by the applicant with the local community to further inform the socio-economic, recreation and tourism baseline and inform any opportunities from the proposed development which arise therein.

Government and industry reports will be used to determine the expected capital and operational expenditure associated with the proposed development, as well as the breakdown of expenditure by different contracts (e.g. turbine, balance of plant). An assumption will then be made based on the share of each type of contract that can be secured regionally and nationally. This increase in turnover will then be used to estimate the economic impact associated with the proposed development.

The method to assess the socio-economic effects will be based on industry best practice and will consider the share of contracts that can be secured in each study area, and the level of employment that can be supported as a result.

In order to assess effects on tourism and recreation assets, the features that make them distinctive and attractive, such as how they display local heritage, will be identified. The potential impact of the proposed development on those key features will then be assessed, with consideration of chapters of the EIA Report where relevant, to determine the magnitude of change.

## 14.4 Consultation

The assessment will use desk-based information sources to assess the likely effects, supplemented by consultation with stakeholders if relevant. Information to inform the baseline will be sought from various sources, including:

- Stirling Council;
- Local Community Councils;
- Cycling Scotland;
- Scottish Rights of Way and Access Society; and
- Sustrans Scotland.

## 14.5 Matters Scoped Out

It is proposed that any substantial, adverse impacts identified as part of the standalone socio-economic, tourism and recreation assessment will be considered as part of the EIA, and all other impacts will be scoped out.

## 14.6 Approach to Mitigation

Proposed mitigation measures will depend on the findings of the assessment. Proposed measures that will be adopted to enhance the socio-economic impacts include:

- Engaging early with the local community and local businesses;
- Providing clear information on technical requirements that can allow businesses to prepare; and
- Incentivising Tier 1 suppliers to engage with local businesses.



- Other measures will be identified as part of the standalone socio-economic and tourism assessment.

## 14.7 Questions for Consultees

The following questions are directed to consultees:

- Q14.1: Do you agree that the scope of the proposed assessment is appropriate (including elements to be scoped out)?
- Q14.2: Are there any particular sources of information or socio-economics or tourism effects that should be considered.

## 14.8 References and Standard Guidance

National Planning Framework 4;

Scottish Natural Heritage (2013) A handbook on environmental impact assessment;

Scottish Government (2019) Good Practice Principles for Shared Ownership of Onshore Renewable Energy Developments;

Scottish Government (2019) Good Practice Principles for Community Benefits from Onshore Renewable Energy Developments;

Scottish Government (2016) Draft Advice on Net Economic Benefit and Planning;

Scottish Natural Heritage (2015) Good Practice During Wind Farm Construction; and  
Tourism Scotland 2020.



## 15.0 Other Environmental Issues

### 15.1 Introduction

A number of other environmental issues will be considered in relation to the proposed development. The approach to the following topics is discussed:

- Forestry;
- Infrastructure;
- Telecommunications;
- Television Reception;
- Shadow Flicker;
- Climate and Carbon Balance;
- Air quality;
- Population and human health; and
- Waste and environmental management.

Some of these topics have previously been proven not to be significant issues for wind farms in the vicinity of the Site and therefore it is anticipated that these can be scoped out of the EIA, where relevant. These topics, including reference to how they will be assessed or if they are proposed to be scoped out, are discussed in turn in the following text.

### 15.2 Forestry

#### 15.2.1 Introduction

This section sets out the proposed approach to the assessment of potential effects on the forestry within the Site which would result from the construction and operation of the proposed development.

In the UK there is a strong presumption against permanent deforestation unless it addresses other environmental concerns. In Scotland, such deforestation is dealt with under the Scottish Government's "Control of Woodland Removal Policy" (Forestry Commission Scotland, 2009)<sup>42</sup>. The purpose of the policy is to provide direction for decisions on woodland removal in Scotland. It will be essential that the proposed development addresses and satisfies the requirements of the Policy. The proposed development is located within an extensive area of commercial forestry.

The protection for Scotland's native woodlands has been strengthened with the introduction of NPF4<sup>43</sup>. Policy 6 Part b) states that:

Development proposals will not be supported where they will result in:

- Any loss of ancient woodlands, ancient and veteran trees or adverse impact on their ecological condition;

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<sup>42</sup> Forestry Commission Scotland (2009). The Scottish Government's Policy on the Control of Woodland Removal. Forestry Commission, Edinburgh.

<sup>43</sup> Scottish Government (2023). National Planning Framework 4: Available at: <https://www.gov.scot/publications/national-planning-framework-4/> [accessed 8th April 2024]



- Adverse impacts on native woodlands, hedgerows and individual trees of high biodiversity value, or identified for protection in the Forestry and Woodland Strategy;
- Fragmenting or severing woodland habitats, unless appropriate mitigation measures are identified and implemented in line with the mitigation hierarchy;

This reinforces the implementation guidance for the Control of Woodland Removal Policy (CoWRP) which states there is a presumption against woodland removal of UK Biodiversity Action Plan (BAP) priority woodland types in areas mainly composed of ancient, semi-natural woodland (ASNW), ancient woodlands planted with native species, long-established woodlands of plantation origin (LEPO) with significant biodiversity interest, or well-established semi-natural priority woodland types.

### 15.2.2 Baseline Conditions

The forestry on the Site is owned by the Scottish Ministers on behalf of the Scottish nation and managed by FLS. It is part of the Carron Valley Forest which is located north of the Campsie Fells and Kilsyth Hills, surrounding the Carron Valley Reservoir. It consists of two forest 'blocks' – Carron Main Block to the south of the reservoir and Cairnoch Block to the north. The proposed development is located entirely within the Cairnoch Block.

The Carron Valley Land Management Plan (LMP) was approved in 2016 and expires in 2026. Due to an increase in the larch disease *Phytophthora ramorum* in the forest an amendment was submitted in 2022 to gain approval for the removal of all larch within Carron Valley Forest over the remaining LMP approval period.

Carron Valley Forest is a long established commercial forest created over an extended period of time which is now into the production phase with ongoing felling and replanting. It is one of the primary productive forests within the Scottish Lowlands District and the intention is to maintain this productive capacity while continuing to diversify species and woodland type.

Sitka spruce is the main commercial species, and will remain so, but it is planned to include a more diverse range of conifers; introduce a productive broadleaf element; and increase significantly the proportion of native woodland.

A desk-based assessment revealed there are no woodlands within the Site boundary recorded in the Ancient Woodland Inventory Scotland (AWIS)<sup>44</sup>. A number of areas are recorded in the Native Woodland Survey of Scotland (NWSS)<sup>45</sup>. The woodlands are described as upland birch woodland or wet woodland. These areas are identified as Core Native Woodland zones in the Forestry Grant Scheme (FGS) Native Woodland – Integrated Habitat Network with the immediate surrounding areas classed as Primary Zones for native woodland expansion and larger areas covering much of the Site classed as Secondary Zones. It should, however, be noted that this is not a statutory designation and while the proportion of native woodland in the forest will be increased under the LMP restocking plans the main woodland type will remain commercial conifers.

### 15.2.3 Method of Assessment and Reporting

The Forestry Study Area will include the entire forest management unit of the Carron Valley Forest LMP.

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<sup>44</sup> Scottish Natural Heritage (2010). Ancient Woodland Inventory Scotland. Available at: <https://map.environment.gov.scot/sewebmap> [accessed on 15th May 2024]

<sup>45</sup> Forestry Commission Scotland (2013). The Native Woodland survey of Scotland. Available at <https://scottishforestry.maps.arcgis.com/apps/webappviewer/index.html?id=0d6125cfe892439ab0e5d0b74d9acc18> [accessed on 15th May 2024]



The forestry baseline will describe the crops existing at time of preparation of the EIA Report. This will include current species; planting year; any felling and replanting plans; and other relevant woodland information. The baseline will be compiled from a desk based assessment and field surveys. The desk based assessment will include landowner crop databases; the Native Woodland Survey of Scotland; the National Forest Inventory; aerial photography; Scottish Forestry publicly available databases; and current Policy, Legislation and Guidance.

The field survey will consist of a Site walkover to verify and update baseline data as necessary; assess the crops with respect to integration of the development infrastructure; and to identify any opportunities within the woodlands for onsite compensatory planting, if required.

A proposed development Forest Plan will be prepared. This will include a felling plan to show which woodlands are to be felled, and when, for the construction and operation of the proposed development. It will further include a restocking plan showing any areas which are to be replanted and with which species, and which areas are to be left unplanted for proposed development infrastructure.

A key issue will be the integration of the proposed development infrastructure into the forest structure to minimise the loss of woodland area and to prevent fragmentation of the remaining woodlands. Forest design and the effect of the proposed development infrastructure on it is an important part of the overall design process.

The changes to the woodland structure will be analysed and described including changes to woodland composition, timber production, traffic movements and the felling and restocking plans. The resulting changes to the woodland structure will be assessed for compliance against the UKFS and the requirement for compensation planting to mitigate against any woodland loss. The proposed development Forest Plan will be compared with the baseline data in line with the methodology outlined in Annex V of the Control of Woodland Removal Policy Guidance (Forestry Commission Scotland, 2019)<sup>46</sup> to calculate the woodland loss.

There is potential for changes to the forest structure resulting from the proposed development, with consequential implications for the wider felling and restocking plans across the remaining parts of the forest management unit. It is anticipated areas of woodland will require to be felled for the construction and operation of the proposed development including for access tracks, wind turbine locations and other infrastructure. The potential effects will be changes to the structure of the woodlands, which may result in a loss of woodland area.

Commercial forests are dynamic environments and constantly changing through for example landowner activities; market forces; natural events, such as windblow or pest and diseases; or developments. Forestry is not regarded as a receptor for EIA purposes. The forestry assessment will be a factual assessment describing the changes to the forest structure resulting from the incorporation of the proposed development into the forests, in particular the loss of woodland area. Other Chapters within the EIA Report will identify the sensitive receptors relevant to their disciplines and report on the environmental effects of the proposed development forestry proposals.

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<sup>46</sup> Forestry Commission Scotland (2019). Guidance to Forestry Commission Scotland staff on implementing the Scottish Government's Policy on Control of Woodland Removal. Available at <https://forestry.gov.scot/publications/349-scottish-government-s-policy-on-control-of-woodland-removal-implementation-guidance/viewdocument> [accessed on 3 March 2021].



## 15.2.4 Consultation

The main forestry consultee will be Scottish Forestry (SF), Central Scotland Conservancy. SF will be consulted to ensure that the proposed changes to the forestry address the requirements of the Scottish Government's CoWRP and other relevant guidance. In addition, there may be interrelated issues raised by other consultees.

## 15.2.5 Matters Scoped Out

The changes to the woodlands for a particular development are regarded as site specific and it is considered there are no cumulative onsite forestry issues to be addressed, therefore cumulative forestry effects are scoped out of the EIA Report.

## 15.2.6 Approach to Mitigation

Measures to avoid or mitigate potential effects upon the woodlands will, as far as practicable, sought to be embedded in the design of the proposed development through consideration of the siting of the wind turbines; and by using existing access tracks and forest roads where possible. Woodland loss would be minimised by keyholing infrastructure into the felling and / or restocking plans as appropriate.

Potential forms of mitigation may include a redesign of the existing forest structures including, for example, changes to the felling programme; the use of designed open space; alternative species and woodland types; changing the management intensity; or the provision of compensatory planting on or offsite.

## 15.2.7 Questions for Consultees

The following questions have been designed to ensure that the proposed methodologies and assessment are carried out in a robust manner and to the satisfaction of the determining authorities.

- Q15.1: Are consultees content with the proposed methodology and scope (including the elements proposed to be scoped out) for the forestry assessment?
- Q15.2: Do the consultees have any information, particularly with reference to new guidance, which should be taken into account?

## 15.2.8 References and Standard Guidance

The documents listed below will be considered within the forestry assessment together with the other documents referred to in the text above.

### 15.2.8.1 Legislation Policy and Guidance

Forestry and Land Management (Scotland) Act 2018;

The Waste (Scotland) Regulations 2012;

UK Environmental Protection Act 1990;

EU Waste Legislation Waste Framework Directive;

Forestry Commission Scotland (2013); The Native Woodland Survey of Scotland;

National Planning Framework 4;

Right Tree in the Right Place: Planning for forestry and woodlands;

Scottish Government's Control of Woodland Removal Policy;

Scotland's Forestry Strategy 2019 – 2029;





Scotland's Third Land Use Strategy 2021 – 2026;  
Scottish Government's Policy on Control of Woodland Removal: implementation guidance;  
Scottish Environment Protection Agency (SEPA) guidance document WST-G-027, 'Management of Forestry Waste';  
Scottish Natural Heritage (2010): Ancient Woodland Inventory Scotland;  
SEPA (2014): LUPS-GU27 "Use of Trees Cleared to Facilitate Development of Afforested Land";  
The UK Forestry Standard 2017; and  
The UK Woodland Assurance Standard 2018.

### 15.3 Infrastructure

Details and locations of infrastructure including overhead power lines and underground cables will be checked and taken into account during the design of the proposed development.

### 15.4 Telecommunications

Wind farms produce electro-magnetic radiation, which has the potential to interfere with broadcast communications and signals. From an initial review of the Ofcom portal there are no fixed communications links that cross the Site. Planning permission (reference number 22/00715/FUL) has been granted for a telecommunications mast within the Site boundary, however, EWE have agreements in place with the land owner and mast operator to require the relocation of the telecommunications mast, should the proposed development (Carron Valley Wind Farm) be granted consent.

In order to determine the potential impact of the proposed development, initial consultation will be undertaken with the following consultees:

- Ofcom (Scotland);
- Joint Radio Company;
- British Telecom; and
- any relevant mobile phone operators.

All fixed links within a 4km radius of the Site will be checked.

The probability of a significant impact on fixed radio links will be assessed on the basis of Site proximity to transmitter-receiver paths and calculation of Ofcom-recommended clearance zones. Potential changes to the telecommunications environment as a result of the development will be predicted by an assessment of the proximity of the proposed turbines to radio facilities and consultations with Ofcom.

### 15.5 Television Reception

Wind turbines have the potential to adversely affect analogue television reception through either physical blocking of the transmitted signal or, more commonly, by introducing multi-path interference where some of the signal is reflected through different routes.

The proposed development is located in an area, which is served by a digital transmitter and is unlikely to be affected by the proposed development as digital signals are rarely affected. In the unlikely event that television signals are affected by the proposed development, mitigation measures will be considered by the applicant.

Television reception is therefore scoped out of the EIA.



## 15.6 Shadow Flicker

Shadow flicker occurs when a certain combination of conditions prevail at a certain location, time of day and year. It firstly requires the sun to be at a certain level in the sky. The sun then shines onto a window of a residential dwelling from behind the wind turbine rotor. As the wind turbine blades rotate it causes the shadow of the turbine to flick on and off. This may have a negative effect on residents in affected properties. If shadow flicker cannot be avoided through design, technical mitigation solutions are available, such as shutting down turbines when certain conditions prevail.

In the UK, significant shadow flicker is only likely to occur within a distance of 10 times the rotor diameter (of a wind turbine), from an existing residential dwelling and within 130 degrees either side of north.

Once the final turbine layout and parameters are fixed, the locations of residential properties in proximity to the Site will be verified and if any are situated within 10 rotor diameters from the proposed turbine locations, a shadow flicker model will be run to predict potential levels of effect.

The location of all residential dwellings in proximity to the Site will be verified during the EIA.

If no properties are located within the zone of influence of the proposed turbine locations, then shadow flicker will be scoped out of the EIA.

## 15.7 Climate and Carbon Balance

The EIA Regulations 2017 include for consideration of potentially significant effects on climate, which includes greenhouse gas emissions. As a renewable energy project, the proposed development is likely to result in a significant saving in carbon and therefore benefit to the UK climate.

The main aims of the calculation are: to quantify sources of carbon emissions associated with the proposed development (i.e. from construction, operation and transportation of materials, as well as loss of peat as relevant); to quantify the carbon emissions which will be saved by constructing the proposed development; and to calculate the length of time for the project to become a 'net avoider', rather than a 'net emitter' of carbon dioxide emissions. The length of time is termed the 'payback time'.

A carbon balance assessment will be undertaken for the proposed development using guidance Calculating Potential Carbon Losses and Savings from Wind Farms on Scottish Peatlands<sup>47</sup>.

## 15.8 Air Quality

Given the distance of the majority of the Site from residential properties, and the well established forestry operations at the Site, the generation of dust during construction activity is unlikely to have a direct impact on any human receptors and would be controlled by means of best practice to be described in the EIA Report.

Consideration will be given within the Ecology, and Hydrology, Hydrogeology and Soils Chapters to the potential impacts that dust generation could have on any identified sensitive ecological or hydrological receptors. If required, detailed mitigation measures will be proposed within these EIA Report Chapters. Otherwise air quality is scoped out of the EIA.

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<sup>47</sup> Calculating Potential Carbon Losses and Savings from Wind Farms on Scottish Peatlands, Nayak et al., 2008; Nayak et al., 2010 and Smith et al., 2011



## **15.9 Population and Human Health**

The EIA Regulations 2017 include a requirement to assess as part of the EIA process, the potential significant effects on population and human health resulting from the proposed development. These requirements will be addressed in the EIA and EIA Report, as appropriate, under each of the other topic headings e.g. noise or socio-economic effects. Where no significant effects are likely these will be scoped out of the EIA.

### **15.10 Waste and Environmental Management**

The applicant is committed to pollution prevention and environmental protection. As such an environmental management strategy to minimise environmental effects of the proposed development during construction will be established. The principles of this strategy will be presented in an outline CEMP appended to the EIA Report. Should consent be granted, the outline CEMP would be revised and updated to a CEMP, the content of which would be agreed with Stirling Council through consultation and enforced via a planning condition. The CEMP would be used by the Contractor to ensure appropriate environmental management is implemented throughout the construction phase of the proposed development.



## 16.0 Schedule of Commitments

A Schedule of Commitments will be included in the EIA Report. This Chapter will summarise the mitigation measures proposed in the preceding Chapters of the EIA Report to reduce or offset the effects of the proposed development on the environment. These are the measures that have been agreed with the relevant stakeholders and will be applied during the construction and operation of the proposed development. A number of these measures are embedded mitigation, undertaken through good practice and to adhere to relevant legislation during all stages of the proposed development.



## 17.0 Invitation to Comment

You are invited to provide comment on this Scoping Report. Please send all Scoping responses to Stirling Council at:

Planning and Building Standards

Stirling Council

Teith House

Stirling

FK7 7QA

[planning@stirling.gov.uk](mailto:planning@stirling.gov.uk)

If you wish to discuss matters contained in this report in greater detail prior to responding to the scoping exercise, please contact:

Alastair Smith

SLR Consulting Ltd

Clockwise Offices

Savoy Tower

77 Renfrew Street

Glasgow

G2 3BZ

[alastairsmith@slrconsulting.com](mailto:alastairsmith@slrconsulting.com)



## 18.0 Closure

This report has been prepared by SLR Consulting Limited with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the client. Information reported herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of EWE; no warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the client and others in respect of any matters outside the agreed scope of the work.





# Appendix 01 Turbine Coordinates

## Carron Valley Wind Farm

EIA Scoping Report

Eurowind Energy Limited

SLR Project No.: 428.V12085.00001

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# Appendix 02 Consultee List

## **Carron Valley Wind Farm**

**EIA Scoping Report**

**Eurowind Energy Limited**

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# Appendix 03 LVIA Wirelines

## Carron Valley Wind Farm

EIA Scoping Report

Eurowind Energy Limited

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# Appendix 04 Confidential Ornithology

## Carron Valley Wind Farm

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# Appendix 05 Cultural Heritage Appraisal Table

## **Carron Valley Wind Farm**

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# Appendix 06 Cultural Heritage Wirelines

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