



Chapter 1: Introduction

Environmental Impact Assessment Report

Cairnoch Hill Wind Farm

3 August 2026



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1.0 Introduction

1.1 Introduction

- 1.1.1 Eurowind Energy Limited (“the Applicant”) is seeking planning permission under the Town and Country Planning (Scotland) Act 1997 (“the Planning Act”) to install and operate up to four wind turbines and associated infrastructure (collectively referred to as “the Proposed Development”) on land owned by the Scottish Ministers and managed by Forestry and Land Scotland (FLS) at Cairnoch Hill within the administrative boundary of Stirling Council (“the Site”). The Site (which is the area encompassed by the application boundary) location and application boundary are shown in **Figure 1.1** and **Figure 1.2** respectively. The Site is centred at British National Grid (BNG) reference NS 69768 85606 and would be known as Cairnoch Hill Wind Farm.
- 1.1.2 The Proposed Development would have an indicative installed electricity generating capacity in the region of approximately 30 megawatts (MW) depending on the final wind turbine model selected. For the purposes of the Environmental Impact Assessment (EIA), the height of the proposed wind turbines has been assessed as 180m to blade tip in an upright position for all four turbines.
- 1.1.3 As the Proposed Development would have a generating capacity of less than 50MW, the Applicant is submitting a planning application to Stirling Council under the Planning Act. As the Proposed Development would likely have a generating capacity of over 20MW depending on the final wind turbine model selected, the Proposed Development is classed as a “Major Development” under the Town and Country Planning (Hierarchy of Developments) (Scotland) Regulations 2009.
- 1.1.4 With regards to connecting the Proposed Development to the electricity grid, the Applicant is currently awaiting the outcome of the Gate 2 Variation Offer process (the Proposed Development has been confirmed as a Gate 2 project, however is still awaiting a formal Gate 2 offer) and, consequently, the connection point, route and infrastructure requirements remain unknown. The grid connection point for the Proposed Development is subject to confirmation by the network operator. As the route of the grid connection cabling (or the form it would take, i.e. whether overhead lines, underground cables or a combination of both) has not been determined, its effects are not identifiable / assessable as it has yet to be designed and an application has not yet been made. Taking account of the *Raeshaw Farms Ltd v Scottish Ministers* [2026] CSIH 10 decision, **Technical Appendix 3.3: Connection to the Electricity Grid - Raeshaw Farms Judgement**, provides detail to support the decision maker in deciding whether or not a wind farm and its grid connection form a single project for the purposes of EIA. Although **Technical Appendix 3.3** sets out an assessment of whether the Proposed Development and its grid connection can be considered to form a single project for EIA purposes, the Applicant is prepared to carry out a further proportionate assessment of the potential effects of the grid connection, at a point where sufficient information is available for it to do so. The grid connection would require separate consent under Section 37 of the Electricity Act 1989.
- 1.1.5 The application for the Proposed Development is accompanied by this report (“the EIA Report”), which has been prepared in accordance with the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 (“the EIA Regulations”).
- 1.1.6 This EIA Report identifies, describes, and assesses the likely significant environmental effects of the Proposed Development and supports the accompanying planning application. It has been undertaken to ensure that



environmental considerations are taken into account during the decision-making process.

- 1.1.7 This chapter provides an introduction to the Proposed Development and the EIA process. It outlines the purpose and structure of the EIA Report, the overall approach to EIA adopted for the Proposed Development and introduces the EIA project team responsible for preparing the assessment.

1.2 Overview of the Proposed Development

- 1.2.1 The Proposed Development comprises an onshore wind farm located at Cairnoch Hill, within the administrative boundary of Stirling Council. It has been designed to maximise the electricity generating capacity from wind available at the Site, while taking account of environmental, technical, and landscape constraints identified through the EIA process.
- 1.2.2 The Proposed Development would consist of up to four three-bladed horizontal-axis wind turbines, each with a maximum blade tip height of up to 180m, together with associated infrastructure. This infrastructure would include turbine foundations and crane hardstandings, new and upgraded access tracks, underground electrical cabling, an onsite substation compound, temporary construction compounds, a borrow pit, and a permanent meteorological (met) mast. Habitat management and enhancement measures would also form part of the Proposed Development.
- 1.2.3 The Proposed Development is described in detail in **Chapter 3: Description of Development**, while the design evolution process and Site context are set out in **Chapter 2: Design Evolution and Alternatives**. The application boundary is shown outlined in red on **Figure 1.2**, while the Site layout of the Proposed Development is illustrated on **Figure 3.1**.
- 1.2.4 The Proposed Development would likely have a total generating capacity of at least 20MW and potentially up to 30MW (dependent on the wind turbine model). Using the lower estimate for generating capacity, based on the Site location and an assumed site specific capacity factor of approximately 40%, the Proposed Development is expected to generate approximately 70,000 megawatt-hours (MWh) of electricity per annum. This equates to the equivalent electricity consumed by approximately 21,000 average UK households¹.

1.3 The Applicant

- 1.3.1 The Applicant is Eurowind Energy Limited (Company Number SC648827). The Applicant is part of the wider Eurowind Energy Group ("Eurowind Energy"). Eurowind Energy was established in Denmark in 2006, and is one of Europe's leading renewable energy developers, with operations in 16 countries across Europe and the United States.
- 1.3.2 Eurowind Energy Limited employs an experienced UK team based in Glasgow that was established in 2021. Eurowind Energy Limited has one operational wind farm and one consented 16MW solar farm at Howpark, in the Scottish Borders. As well as the consented Uisenis Wind Farm project on the Isle of Lewis (189MW) and a growing development portfolio of over 2.9 gigawatt (GW) across the UK.
- 1.3.3 Eurowind Energy develop, construct, and operate wind, solar photovoltaic and 'Power to X' assets across Europe and in the USA. They are dedicated to local long

¹ Calculated using the most recent statistics from Department of Energy Security and Net Zero (DESNZ) showing that annual GB average domestic household consumption is 3,323kWh (as of December 2025).



term solutions, and believe that the future of energy supply is renewable, clean, and sustainable. Projects are developed in close collaboration with a range of local stakeholders to develop smart schemes that work for all. Eurowind Energy only engages in projects that they, themselves, want to invest in.

- 1.3.4 Further information on Eurowind Energy can be found on its company website at <https://www.eurowindenergy.com>.

1.4 The Proposed Development Site and Context

- 1.4.1 The Proposed Development Site is located at Cairnoch Hill, on land managed by FLS, within the administrative boundary of Stirling Council. The Site covers an area of approximately 573 hectares.
- 1.4.2 The Site is predominantly characterised by commercial conifer plantation, with areas of recent felling, and lies within the Lennox Hills, immediately north of the Carron Valley Reservoir. Elevations across the Site range from approximately 227m to 413m Above Ordnance Datum (AOD). The Site lies within the Southern Hills Local Landscape Area, although there are no nationally designated landscapes within the Site boundary.
- 1.4.3 Access to the Site is provided via the B818 and an existing network of forestry tracks.
- 1.4.4 The nearest settlement is the hamlet at Carron Valley reservoir dam, approximately 1.25km east of the Site. Fintry is located approximately 6km to the west. Other nearby towns include Kilsyth, Denny, and Stirling, located approximately 5.3km to 8.3km from the Site. There are a number of residences located within 1.25km of the Site, with the closest residential properties being located to the south (Cairnoch Bothy and Cairnoch Farm), and the north (Easter Cringate and Cairnoch Lodge) of the Site. These four properties are financially involved in the Proposed Development.
- 1.4.5 The Carron Valley Reservoir lies immediately to the south of the Site.
- 1.4.6 A number of operational, consented, and proposed wind energy developments are located within the wider surrounding area and have been considered as part of cumulative assessment.
- 1.4.7 Several statutory and non-statutory environmental designations are present in the area surrounding the Site, although none are located within the Site itself.
- 1.4.8 Further detail on the Site, surrounding area, and design evolution of the Proposed Development is provided in **Chapter 2: Design Evolution and Alternatives**, with topic-specific assessment set out in subsequent technical chapters.

1.5 Purpose of the EIA Report and Approach to EIA

- 1.5.1 SLR Consulting Limited (“SLR”) was appointed by the Applicant to undertake the EIA of the Proposed Development and to prepare this EIA Report in accordance with Regulation 5 of the EIA Regulations.
- 1.5.2 The Proposed Development constitutes an installation for the harnessing of wind power for energy production and, as it would involve the installation of more than two wind turbines with heights exceeding 15 metres, it falls within Part 12, Schedule 2, Paragraph 2, Table, Paragraph 3(j) of the EIA Regulations.
- 1.5.3 EIA is the systematic process of identifying, predicting, and evaluating the likely significant environmental effects of a proposed development. The EIA process is intended to support the decision-making process by assisting the relevant local



- authority in determining the planning application, through the provision and consideration of comprehensive environmental information.
- 1.5.4 Where appropriate, the EIA process identifies mitigation and enhancement measures designed to avoid, reduce or offset potentially significant effects, and any residual effects (those effects that are expected to remain following implementation of mitigation measures) are identified. This includes the identification of opportunities for positive environmental effects, including biodiversity enhancements, where relevant.
- 1.5.5 Given the nature, scale, and location of the Proposed Development, it was recognised at an early stage that the project had the potential to give rise to significant environmental effects. As such, an EIA was undertaken voluntarily in accordance with Regulation 6(2)(c) of the EIA Regulations, without seeking a formal EIA screening opinion from Stirling Council.
- 1.5.6 In accordance with the EIA Regulations, this EIA Report is based on the Scoping Opinion received from the Council on 13 November 2024.
- 1.5.7 The EIA has been undertaken as an iterative process throughout the development of the Proposed Development, rather than as a single assessment following design finalisation. This approach has enabled environmental considerations to inform and influence the evolution of the design where relevant, helping to achieve an environmentally responsible scheme.
- 1.5.8 As required by the EIA Regulations, the findings and conclusions of the EIA are summarised in a standalone, easily accessible, Non-Technical Summary (NTS). This enables anyone with an interest in the Proposed Development to understand and access information on its potential environmental effects.

1.6 Structure of the EIA Report

- 1.6.1 The EIA Report is structured into four volumes, of which the NTS comprises Volume 1.
- 1.6.2 The EIA Report chapters are Volume 2 of the EIA Report and are structured as set out below.
- **Chapter 1 – Introduction:** provides an introduction to the EIA Report. It includes information on the broad approach to EIA, and sets out the structure of the EIA Report, including confirmation of the topics scoped out of the EIA.
 - **Chapter 2 – Design Evolution and Alternatives:** provides information on how the Site was identified and selected, and a description of the design iteration process, detailing how the Proposed Development evolved through the course of the assessment process and the alternative development options considered. This chapter also includes a summary of all embedded (primary) mitigation measures.
 - **Chapter 3 – Project Description:** provides a description of the existing Site, details of the Proposed Development, the construction, operation and maintenance processes, decommissioning process, need for the development and carbon considerations.
 - **Chapter 4 – Policy Context:** Sets out the need for the Proposed Development and considers it in the context of national, strategic, and local renewable energy and planning policy.
 - **Chapter 5 – Environmental Impact Assessment:** Describes the EIA methodology applied across the assessment, including the approach to



identifying likely significant effects, assessing cumulative impacts, and defining mitigation, enhancement, and residual effects.

- **Chapter 6 – Scoping and Consultation:** Summarises the scoping process undertaken for the EIA and outlines consultation carried out with statutory consultees, stakeholders, and the local community, including how feedback has informed the assessment.
- **Chapter 7 – Landscape and Visual:** Assesses the potential and residual effects of the Proposed Development on landscape character and visual amenity.
- **Chapter 8 – Ecology:** Assesses the potential and residual effects on ecology and nature conservation interests, including designated sites and protected species.
- **Chapter 9 – Ornithology:** Assesses the potential and residual effects on birds, including collision risk and potential displacement effects.
- **Chapter 10 – Hydrology, Hydrogeology, Geology and Soils:** Assesses the potential and residual effects on surface water, groundwater, peat, soils, and geological resources.
- **Chapter 11 – Cultural Heritage and Archaeology:** Assesses the potential and residual effects on cultural heritage assets, including archaeological remains and the historic environment.
- **Chapter 12 – Traffic and Transport:** Assesses the potential and residual effects on site access, traffic, and transport during construction, operation, and decommissioning.
- **Chapter 13 – Noise:** Assesses the potential and residual effects of noise arising from the construction and operation of the Proposed Development.
- **Chapter 14 – Aviation:** Assesses potential effects on aviation and radar interests and outlines consultation and mitigation measures, including aviation lighting where relevant.
- **Chapter 15 – Other Issues:** Considers additional environmental topics not assessed in standalone chapters, which include shadow flicker, telecommunications, and carbon balance, supported by relevant technical appendices.
- **Chapter 16 – Schedule of Commitments:** Summarises all mitigation and enhancement measures proposed within the EIA Report in a single schedule to inform decision-making and subsequent implementation.

1.6.3 Volume 3 contains the Figures that inform the EIA Report:

- Volume 3a: Figures to support **Chapters 1-7** of the EIA;
- Volume 3b: Proposed development visualisations (NatureScot) – viewpoints 1 - 9;
- Volume 3c: Proposed development visualisations (NatureScot) – viewpoints 10 - 18; and
- Volume 3d: Figures to support **Chapters 8-16** of the EIA.

1.6.4 Volumes 4a and 4b contain technical appendices for each of the above listed chapters where relevant.



- 1.6.5 A suite of additional supporting documents has been prepared to accompany the planning application. These are a Planning Statement, a Pre-Application Consultation (PAC) Report, a Design and Access, a Socio-economic Report, and a Shadow Habitats Regulations Assessment. These documents are separate from the EIA Report.

1.7 Assessment Team and Competency

- 1.7.1 The coordination of this EIA has been led by SLR, with assistance from other specialist technical and environmental consultants (listed in **Table 1-1** below). All are suitably qualified and competent experts in their field, as is required in accordance with Regulation 5(5) of the EIA Regulations.
- 1.7.2 SLR is one of the UK's fastest growing multi-disciplinary environmental consultancy firms. Within the energy sector, SLR provides a wide range of planning, environmental and technical services relating to the design and development of wind farms and other renewable energy projects. SLR are involved in all aspects of facility development, from initial concept design, through planning and permitting to the detailed design, construction management and closure stages.
- 1.7.3 Further information on SLR can be found on its corporate website at www.slrconsulting.com.
- 1.7.4 For this project, SLR is responsible for the following technical disciplines:
- EIA and Planning;
 - Landscape and Visual;
 - Ecology
 - Hydrology, Hydrogeology, Geology and Soils;
 - Cultural Heritage and Archaeology;
 - Site Access, Traffic and Transport;
 - Carbon Calculations;
 - Shadow flicker; and;
 - GIS
- 1.7.5 SLR is supported by the following specialist consultancies:
- APEM – Ornithology;
 - TNEI – Noise;
 - Wind Farm Aviation Safeguarding – Aviation and Telecommunications;
 - BiGGAR Economics – Socio-Economics, Tourism, Recreation and Land Use;
 - DGA Forestry – Forestry; and
 - David Bell Planning – Planning.
- 1.7.6 SLR's environmental specialists, with support from subconsultants as required, have the skills and relevant competency, expertise and qualifications to undertake EIA for the Proposed Development. **Table 1-1** demonstrates the relevant competency for each discipline covered in this EIA Report.



Table 1-1: EIA Project Team

Consultant	Company	Experience	Input to the EIA
- Mike Roberts - Alastair Smith - Vanessa Ramirez	SLR	BSc (Hons), MSc, 19 years BSc (Hons), MSc, 8 years BSc (Hons), MSc, GradISEP 2 years	EIA Coordination
- David Bell - Deirdre Thom	David Bell Planning	BSc(Hons) DipUD MCIHT MRTPI, 35 years BA (Hons) MSc MRTPI, 15 years	Planning
- James Welsh - Angus Elder	SLR	BA (Hons), 40 years BSc (Hons), MSc, 15 years	Landscape and Visual Impact Assessment Residential Visual Amenity Assessment
- Duncan Watson - Kirstie Hazelwood - Rowan Smith	SLR	BSc (Hons) MSc, CEnv MCIEEM, 22 years BMus (Hons), MSc, PhD, ACIEEM, 10 years BSc (Hons), MSc, MCIEEM, 6 years	Ecology
Matthew Rea	APEM	BSc (Hons), MSc, ACIEEM 10 years	Ornithology
- Gordon Robb - Alan Huntridge - Ruari Watson - Katy Rainford	SLR	BSc (Hons), MSc, MBA, FCIWEM, C.WEM, 32 years BSc (Hons), MSc, 17 years BSc (Hons), MSc, 12 years BSc (Hons), 7 years	Hydrology, Hydrogeology and Soils
- Beth Gray - Erin Ashby	SLR	MA (Hons), ACIfA, 9 years MA, MSc, 7 years	Cultural Heritage and Archaeology
- Andrew Birchby - Alex Dell	TNEI	Meng, Msc, MIOA 15 years Meng, PhD, MIOA, 5 years	Noise and Vibration
Iain Lamb	SLR	B.Eng (Hons), 30 years	Site Access, Traffic and Transport
Simon Cleary	Biggar Economics	MA (Hons), 14 years	Socio-Economics, Tourism, Recreation and Land Use
Shane Savage	Wind Farm Aviation Safeguarding	BSc, 27 years	Aviation Telecommunications
James Anderson	DGA Forestry	Barch, PgD Forestry, 14 years	Forestry
Ruari Watson	SLR	BSc (Hons), MSc, 12 years	Carbon Emissions
Darren Keogh	SLR	Beng, Mphil, Phd, 24 years.	Engineering and CAD



Consultant	Company	Experience	Input to the EIA
• Ruairidh Aitken		BSc (Hons), 13 years	
• Jack Hughes	SLR	BSc, MSc, 2 years	Shadow Flicker
• Lauren McConnachie	SLR	BSc, BSc (Hons), MSc, 10 years	GIS
• Jacob Scoble		BSc, 7 years	

1.8 Availability of the EIA Report

- 1.8.1 In accordance with Section 21 of the EIA Regulations, copies of the EIA Report will be available for inspection by the public, notice of which will be published on the Stirling Council application website, in a newspaper circulating in the locality of the Proposed Development, and in the Edinburgh Gazette.
- 1.8.2 Printed copies of the NTS and EIA Report are available by request from:
SLR Consulting Limited,
24 St. Vincent Place,
Glasgow,
United Kingdom,
G1 2EU
Tel: 07718 482283
- 1.8.3 A printed copy of the EIA Report and other application documents will be available to view during opening hours (Monday to Friday 9am to 5pm) at the following location:
Stirling Council Offices,
Old Viewforth,
Stirling,
FK8 2ET
- 1.8.4 Electronic copies of the EIA Report, including all Figures, technical appendices and accompanying documents are available to view on the Stirling Council website: <https://pabs.stirling.gov.uk/online-applications/> and can also be accessed at the Applicants project website: <https://www.cairnochhillwindfarm.com/>.
- 1.8.5 Hard copies of the full suite of submission documents can be made available for a charge of £1,800.00 per copy. Alternatively, a USB copy can be made available on request at a charge of £20 per copy.

1.9 Representations to the Application

- 1.9.1 Any representations in relation to the planning application should be made directly to Stirling Council at:
- (By post)
- Planning Services
Stirling Council,
Teith House,
Kerse Road,
Stirling,
FK7 7QA
- (By Email)



planning@stirling.gov.uk

(Online)

<https://www.stirling.gov.uk/planning-and-building/planning/view-and-comment-on-planning-applications/>

1.10 References

Department for Energy Security and Net Zero (DESNZ) (2025). Subnational Electricity and Gas Consumption Statistics. Available at:

<https://assets.publishing.service.gov.uk/media/6945728a033693d5d50eb83d/subnational-electricity-and-gas-consumption-summary-report-2024.pdf>

Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017. Available at: <https://www.legislation.gov.uk/ssi/2017/102/contents>

Town and Country Planning (Hierarchy of Developments) (Scotland) Regulations 2009. Available at: <https://www.legislation.gov.uk/ssi/2009/51/contents>

Town and Country Planning (Scotland) Act 1997. Available at: <https://www.legislation.gov.uk/ukpga/1997/8/contents>

1.11 Abbreviations List

Abbreviation	Meaning
AOD	Above Ordnance Datum
BNG	British National Grid
DESNZ	Department for Energy Security and Net Zero
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
FLS	Forestry and Land Scotland
GIS	Geographic Information System
GW	Gigawatt
LDP	Local Development Plan
MW	Megawatt
MWh	Megawatt-hours
NTS	Non-Technical Summary
PAC	Pre-Application Consultation
SLR	SLR Consulting Limited



Making Sustainability Happen



Chapter 2: Design Evolution and Alternatives

Environmental Impact Assessment Report

Cairnoch Hill Wind Farm

3 August 2026



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2.0 Design Evolution and Alternatives

2.1 Introduction

- 2.1.1 The EIA Regulations require the consideration of alternatives and an indication of the reasons for selecting the Site, except where limited by constraints of commercial confidentiality. Schedule 4, Paragraph 2, of the EIA Regulations notes the following requirement: *“A description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects”*.
- 2.1.2 This chapter outlines the process undertaken in selecting the Site as a suitable location for a wind energy generation project, provides a description of the Site and surrounding area, and discusses the design evolution process.
- 2.1.3 The principles of the EIA process; that Site selection and project design should be an iterative constraint-led process, have been followed for the Proposed Development. This has ensured that potential significant adverse impacts, as a result of the Proposed Development, have been avoided or minimised as far as reasonably possible through the design process.
- 2.1.4 This chapter covers issues considered in more detail in the relevant technical chapters (**Chapters 7 to 16**). This chapter does not pre-empt the conclusion of the latter chapters but explains how potential environmental effects have informed the design of the Proposed Development.
- 2.1.5 The final design for the Proposed Development is described in **Chapter 3: Description of the Development** and is shown on **Figure 3.1**. The final design was arrived at following iterative consideration of many alternative design configurations, including location of turbines, turbine scale, layout and design of tracks and ancillary infrastructure.
- 2.1.6 This chapter is supported by the **Design and Access Statement** which is separate from the EIA Report, however is part of the suite of planning application documents.

2.2 Site Selection and Consideration of Alternatives

- 2.2.1 National Planning Framework 4 (NPF4) was adopted by the Scottish Government on 13 February 2023 and outlines Scotland's long-term spatial strategy up to 2045. The framework is grounded in addressing the global climate emergency and the biodiversity crisis. NPF4 advocates for a substantial and swift expansion of renewable energy generation to help Scotland meet its net-zero emissions goals. It indicates that onshore renewable energy projects will generally be supported, with the exception of onshore wind farm developments within National Parks (being the statutorily designated areas established under the National Parks (Scotland) Act 2000) and National Scenic Areas (being the statutorily designated areas established by way of direction in accordance with the Planning Act).
- 2.2.2 As discussed in **Chapter 4: Renewable Energy and Planning Policy**, NPF4 highlights the need for renewable energy to be generated in the Central Scotland area (which includes the Site).
- 2.2.3 As detailed above, the Site location, being within central Scotland, and not located within a National Park or National Scenic Area, is in accordance with NPF4.
- 2.2.4 A number of other factors were considered when selecting the Site as the location for the proposed development, including:



- The topography surrounding the Site limits visibility of wind turbines from settlements in the wider area, including but not limited to Fintry, Kilsyth, Cambusbarron, Stirling, Denny, Kippen and Gargunnock;
- Initial desk-based studies and wind monitoring on Site suggest that there is a very good wind resource and the Site is available for wind energy development;
- The Site does not support any international or national ecological or landscape designations;
- The Site is FLS managed land, and is largely covered by conifer plantation. The co-location of wind turbines and conifer plantation is considered to be a productive use of the land, avoiding potentially more ecologically valuable areas, and allowing for existing onsite infrastructure such as forestry tracks, to be utilised; and
- The Site is located in the central belt of Scotland, relatively close to large population centres and therefore in close proximity to the majority of Scottish energy demand.

Technology, Size and Scale

- 2.2.5 In order to ensure the maximum energy yield from the Site (for project viability and to aid progress towards renewable energy targets), wind turbines up to 200m to tip height were considered.
- 2.2.6 During the period leading up to a consent and ultimately the construction of the Proposed Development, it is expected that the design and manufacture of commercial wind turbines will evolve and result in a wider choice of wind turbines than is currently available. The ability to maximise the potential yield from the Site through wind turbine choice at the point of procurement is important for the financial feasibility of the scheme, in a time of increasing financial uncertainty. Without the ability to optimise the project in such circumstances, it may adversely affect the viability of the Proposed Development.
- 2.2.7 The supply of smaller wind turbines across Europe continues to reduce due to lack of demand as manufacturers are recognising that the world market is shifting to larger, more efficient machines and are focussing their development work on larger wind turbines which secure the highest yield.
- 2.2.8 Therefore, it is clear that larger turbines (tip heights and rotor diameters) need to be considered in order to ensure a scheme's viability and constructability. In addition to viability and constructability, fewer numbers of larger turbines can also result in less associated infrastructure, such as new access tracks, wind turbine foundations and crane pads, and in turn potentially result in less environmental impact. As a result of this, wind turbines with tip heights up to 200m, were considered for this Site as part of initial feasibility studies.
- 2.2.9 Despite the continuing move towards larger turbines on the grounds of economic viability and available technology, it is also important to consider the Site and its surroundings in order to understand what size of wind turbine may be appropriate. The purpose of a wind farm development is to harness the wind to generate electricity and from a yield perspective only, the optimum design would locate wind farms in areas exposed to the highest wind speeds, with wind turbines placed in the most exposed locations. However, this may not account for the potential environmental effects of a wind farm. The design of a wind farm must therefore balance environmental effects and energy yield. In addition to these factors, the technical limitations of constructing a wind farm must also be considered in the design stage.
- 2.2.10 The design process is iterative and develops in tandem with environmental surveying to identify environmental sensitivities which are considered and taken into account



within the design process. As environmental effects and sensitivities have been identified, the layout of the Proposed Development has undergone a series of modifications to avoid or reduce potential environmental effects through careful design. This process has resulted in the layout of the Proposed Development presented in this EIA Report. This layout represents what is considered to be the optimum fit within the technical and environmental parameters of the Site and its surroundings.

- 2.2.11 In addition to the wind turbine layout, the other elements of the Proposed Development which have been designed to minimise environmental effects include: the access tracks, proposed borrow pit, crane hardstanding areas, temporary construction compounds, and the substation compound. The effects of these have been minimised through use of existing track infrastructure where possible, careful environmental surveying, design, siting, routing and proposed 'good practice' construction methods.
- 2.2.12 There were multiple elements of the Site and its surroundings that were looked at when considering the size of wind turbine that may be appropriate, these included:
- The proximity and primary orientation of nearby residential receptors and potential residential visual amenity and noise issues;
 - Local landscape designations and the sensitivity of the landscape to tall turbines;
 - The proximity to National Parks and National Scenic Areas;
 - The proximity to, and visibility from, key cultural heritage assets;
 - Local bird populations and species type (and how wind turbine size and configuration might affect these);
 - The ability to get wind turbine components to Site;
 - Radar (weather / climate);
 - The scale of the topography of the Site itself, as well as surrounding hills and landscapes;
 - The landscape character of the Site and its context, informed by the Stirling Council landscape character types (LCTs); and
 - The availability of a viable grid connection.
- 2.2.13 Taking the above inputs and considering them alongside the desire to get the maximum energy yield from the Site, it was concluded that the Site could accommodate wind turbines up to 180m to tip height. Turbines over 180m to tip height were considered likely to have increased radar (weather / climate) impacts, and also an increased impact on cultural heritage assets e.g. Sir John de Graham's Castle, and Stirling Castle.

2.3 Site Description and Context

The Site

- 2.3.1 The Site is located on Forestry and Land Scotland ("FLS") managed land at Cairnoch Hill, within the Lennox Hills, just north of the Carron Valley Reservoir (within 30m). The centre of the Site is at National Grid Reference NS 69768 85606. It lies entirely within the Stirling Council administrative boundary, although is only approximately 420m from the North Lanarkshire Council boundary to the south. The Site is situated south west of Stirling, west of Denny, east of Fintry, and north of Kilsyth.
- 2.3.2 There are no statutory environmental designations within the Site, which is predominantly covered by conifer plantation (with some areas recently felled).



- 2.3.3 Elevations across the Site range from approximately 227m AOD at the south western edge of the Site, to approximately 413m AOD in the centre of the Site (summit of Cairnoch Hill).
- 2.3.4 The Site has limited peat or peatland habitat as a result of its topography and recent history of plantation conifer forestry. There are some exceptions to this, such as an area of degraded blanket bog at the summit of Cairnoch Hill, and an area of deeper peat at the eastern edge of the Site.
- 2.3.5 Several small watercourses/tributaries run through the Site, and into Carron Valley Reservoir, the Endrick Water and Earl's Burn.
- 2.3.6 The entire Site is within the Southern Hills Local Landscape Area, but no part of it or the surrounding area is designated as a nationally important landscape.
- 2.3.7 Access to the Site is provided via the B818 and an existing network of forestry tracks.

Surrounding Area

- 2.3.8 The nearest settlement is the hamlet at Carron Valley reservoir dam, approximately 1.25km east of the Site. Fintry is located approximately 6km to the west. Other nearby towns include Kilsyth, Denny, and Stirling, located approximately 5.3km to 8.3km from the Site. There are various scattered residential properties which are closer to the Site, such as Easter Cringate and Cairnoch Lodge to the north, and Cairnoch Bothy and Cairnoch Farm to the south (these four properties are financially involved in the Proposed Development).
- 2.3.9 The B818 runs east to west between the southern boundary of the Site and the northern shoreline of Carron Valley Reservoir, connecting Denny in the east and Fintry in the west.
- 2.3.10 The Carron Valley Reservoir is located immediately south of the Site, on the southern side of the B818. The Endrick Water runs north-south approximately 450m west of the Site. The Earl's Burn is located immediately north east of the Site at its closest point.
- 2.3.11 The North Lanarkshire Council area is located approximately 420m to the south of the Site.
- 2.3.12 The Kilsyth Hills Special Landscape Area (SLA) is located about 550m south of the Site, on the southern side of Carron Valley Reservoir.
- 2.3.13 There is a core path which runs from Kippen through the Gargunnock hills, to the western edge of the Site.
- 2.3.14 A scheduled monument, Sir John de Graham's Castle (SM4278), is situated approximately 100m west of the Site. Further scheduled monuments lie to the east and west of the Site, with Todholes cairns (SM4491 and SM2492) located within 2km of the Site.
- 2.3.15 **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 from Site to Nearest Turbine	Specification
Craigannet Turbine	Operational	190m east	1 turbine, 102m to blade tip
Craigengelt Wind Farm	Operational	450m north east	8 turbines, 125m to blade tip



Wind Farm	Status	Distance from Site to Nearest Turbine	Specification
Earlsburn Wind Farm	Operational	520m north	15 turbines, 110m to blade tip
Shelloch Wind Farm	Consented	1.6km north west	5 turbines, between 149.9m to 180m to blade tip
Earlsburn North Wind Farm (Kingsburn Wind Farm)	Operational	2.5km north	9 turbines, 115m to blade tip
Earlsburn Extension Wind Farm	Consented	2.7km north	7 turbines, 149.9m to blade tip
Drummarnock Wind Farm	In Planning	1km north east	4 turbines, 180m to blade tip

2.3.16 Several statutory ecological designations exist within 10km of the Site, including:

Table 2-2: Statutory Ecological Designations within 10km of the Site

Designation Name	Distance from Site
Endrick Water SAC/SSSI	2km west
Carron Glen SSSI	3.8km east
Denny Muir SSSI	3.9km south east
Double Craigs SSSI	4.2km west
Corrie Burn SSSI	4.8km south
Sauchie Craig Wood SSSI	5.9km north east
Dullatur Marsh SSSI	7.5km south east
Sculliongour Limestone Quarry SSSI	7.8km south west
Balglass Corries SSSI	8.6km west
Wester Balgair Meadow SSSI	9.5km north west

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

2.4 Design Principles

2.4.1 In EIA, constraint identification should continue from site selection, throughout the design process in order to take cognisance of new, more detailed surveys revealing any additional limitations to development. This allows the findings of technical and environmental studies to inform the design of a development and achieve a 'best fit' within the environment of the Site.



- 2.4.2 This approach has been adopted in respect of the Proposed Development; where potentially significant effects have been identified, efforts have been made to avoid these by evolving the design of the Proposed Development. This is referred to within this EIA Report as mitigation embedded in the Proposed Development layout and design, or simply 'embedded mitigation' (avoiding the potential for impacts to arise through proposed development design). Information on embedded mitigation is summarised in **Table 2-3** and explained further within each technical chapter of this EIA Report as appropriate.
- 2.4.3 'Embedded mitigation' refers to measures integrated into the project design to minimise environmental impacts. These include, but are not limited to:
- Ensuring the size and scale of the development are appropriate for its location;
 - Designing access tracks to reduce the need for extensive earthworks, which helps limit ecological, hydrological, and landscape and visual impacts;
 - Utilising existing infrastructure at the Site e.g. tracks and borrow pits, where possible;
 - Sensitive siting of the proposed infrastructure incorporating appropriate buffer distances from environmental receptors (including nearby residential properties) to avoid or reduce effects;
 - Considering the appearance, finish, and colour of wind turbines and control buildings in line with NatureScot's guidance on wind farm siting and design (Siting and Designing Wind Farms in the Landscape Guidance, 2017);
 - Incorporating borrow pits into the Proposed Development to reduce the need for importing materials to the Site; and
 - Potential for up to 50m micro-siting of infrastructure during construction to ensure the best possible location is chosen based on Site investigations.
- 2.4.4 In addition to embedded mitigation, there are several design principles which have been incorporated into the design of the Proposed Development. These are:
- Single row of wind turbines in order to allow 'clean' and balanced view;
 - Wind turbines to be pushed north away from reservoir and associated LCT; and
 - Avoid wind turbines appearing at excessively different heights to each other (as a result of topography).
- 2.4.5 Where possible, proposed excavation for access tracks and other infrastructure has been minimised. The location of the substation compound and temporary construction compounds have also been given consideration in relation to reducing potential landscape and visual effects. These have been located in areas where natural screening occurs via landform, helping to reduce their potential prominence.

Stakeholder Consultation

- 2.4.6 Formal Pre-Application Advice was requested from Stirling Council, by the Applicant, in May 2024. Advice was received in August 2024, primarily highlighting constraints relating to cultural heritage (proximity to Sir John de Graham's Castle) and landscape and visual (scale of development when seen from Carron Valley / Carron Valley Reservoir). This feedback was taken into consideration during the design evolution process.
- 2.4.7 Public consultation events were undertaken in November 2024, March / April 2026 and June 2026, which allowed members of the local community to comment on the design proposals. Feedback from each round of consultation were incorporated into the



design evolution process where possible. Further details of the public consultation process can be found in the **PAC Report** accompanying this application.

- 2.4.8 Statutory consultees were invited to become involved in and input to the design process for the Proposed Development via the EIA Scoping process (see **Chapter 6: Scoping and Consultation** for more detail), and subsequent consultation.

2.5 Iterative Design Process

- 2.5.1 The layout and design of the Proposed Development was considered as part of an iterative design process. An iterative design approach works in tandem with the EIA process and allows a receptive design process aimed at reducing the potential landscape and visual effects of the Proposed Development whilst taking into account other Site constraints and commercial requirements. Several layouts were considered during the design process, with the layout evolving to respond to environmental constraints, cultural heritage constraints, and landscape and visual constraints such as views from the hamlet at the Carron Valley reservoir dam, Fintry, and the Kilsyth hills. Feedback from consultees and the public was also an important driver in the evolution of the Site layout.
- 2.5.2 The agreed representative viewpoints for the Landscape and Visual Impact Assessment (LVIA) (see **Chapter 7** for further information) represent key views experienced by receptors within the 45km LVIA study area. The modelling of the Proposed Development in views from these locations was a key driver in informing the iterative refinement of the wind turbine layout.
- 2.5.3 The design of any wind farm is driven by the key objective of positioning wind turbines so that they capture the maximum energy possible within a suitable area, which is further informed by environmental and technical constraints.
- 2.5.4 The designations at the Site and its surrounding area were identified as the first part of the constraints mapping process. These are shown on **Figure 2.1**. The known environmental and technical constraints within the Site were also identified as part of this early stage constraints mapping. It is important to note that the identification of a constraint does not necessarily result in the exclusion of that area from the potential development envelope; rather it means that careful thought and attention was paid to the constraint and the design altered appropriately. The key constraints which were taken into account during the design process included:
- Topography and ground conditions (including peat);
 - Environmental designations (including SSSI, SPA, and SAC);
 - Identified landscape and visual sensitivities;
 - Proximity to residential receptors (with regards visual amenity, shadow flicker and noise);
 - Presence of birds, protected habitats and species;
 - Presence of watercourses, private water supplies and related infrastructure;
 - Presence of cultural heritage features;
 - Aviation and Radar constraints; and
 - Forestry.
- 2.5.5 The identification of constraints continued throughout the design evolution process as more detailed surveys refined the development envelope.



- 2.5.6 Throughout the constraints led design process, wind and yield analysis was undertaken to ensure changes made to layouts did not adversely affect the output of the Proposed Development.
- 2.5.7 A description of how the various environmental and technical disciplines have contributed to the design through detailed assessment is described below. Information in respect of the survey work undertaken is provided in the technical chapters of this EIA Report

Topography and Ground Conditions

- 2.5.8 Steep areas within the Site (greater than 14% slope gradient) have largely been avoided for the siting of wind turbines and other infrastructure. This is to enable the safe and efficient construction of the wind farm, minimising earthworks. The extent of earthworks required as part of the Proposed Development are shown on **Figure 2.2**.
- 2.5.9 Peat probing was undertaken across the Site in May 2022, October 2024, February 2026 and April 2026. Mapping of the resulting data from these rounds of peat probing allowed areas of deep peat (typically greater than 1.5m) to be avoided by proposed infrastructure.

Landscape and Visual

- 2.5.10 No international or national landscape designations occur within the Site. However, within the 45km LVIA study area there are three national level designations:
- Loch Lomond NSA;
 - The Trossachs NSA; and
 - River Earn (Comrie to St Fillans).
- 2.5.11 Consideration has been had of Stirling Council's draft Supplementary Guidance Landscape Character Assessment (2019). With the proposed wind turbines being located in the L:28 'Lowland Hills' character type, rather than the 'Forested River Basin' character type.
- 2.5.12 Landscape and visual effects are assessed within **Chapter 7: Landscape and Visual**.

Ecology and Ornithology

- 2.5.13 Ecological surveys, including a UK Habitat Classification ("UKHab") survey, a National Vegetation Classification (NVC) Survey and protected species surveys, were carried out across the Site during 2024, in order to identify broad areas of constraint to the Proposed Development. Constraints mapping included the identification of sensitive ecological features, including habitats present within the Site and species which use the Site.
- 2.5.14 A distance of at least 50m between turbine blade tip and the nearest woodland has been established, as per current bat guidance (NatureScot, Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation, 2019).
- 2.5.15 Ornithology surveys have been carried out across the Site from September 2021 to August 2023, including vantage point watches, and breeding raptor surveys. The surveys recorded flights from a number of priority species including Curlew, Osprey, and Red Kite.
- 2.5.16 Standard best practice measures would be implemented during construction (including timing felling works outwith the breeding season) to ensure compliance with relevant legislation protecting all breeding wild birds.



2.5.17 Ecology effects are assessed within **Chapter 8: Ecology** and an assessment of ornithological receptors is presented in **Chapter 9: Ornithology**.

Hydrology and Hydrogeology

2.5.18 A 50m buffer zone has been applied around the drainage watercourses which traverse the Site. These buffers were used to ensure that as much of the proposed infrastructure as possible, other than tracks, is not located in close proximity to hydrological features, in accordance with wind farm construction best practice guidelines (Guidance for Pollution Prevention (“GPP5”), 2018:). This reduces the risk of run off and water pollution into existing watercourses.

2.5.19 Data on private water supplies (PWS) was obtained from landowners, where possible, and supplemented with data from a PWS survey conducted in September 2025.

2.5.20 Effects upon hydrology are assessed within **Chapter 10: Hydrology, Hydrogeology, Geology and Soils**.

Archaeology and Cultural Heritage

2.5.21 There are no designated heritage assets of regional or national importance within the Site.

2.5.22 The closest heritage asset is Sir John de Graham’s Castle approximately 100m to the west of the Site. Wind turbine no.1 was moved north east from its position in the Scoping stage layout, in order to reduce visibility from, and effects on, this asset.

2.5.23 Other key heritage assets that were considered during the design of the Proposed Development include Todholes cairns (SM4491 and SM2492), and Stirling Castle (SM90291).

2.5.24 Effects upon archaeological and cultural heritage assets are assessed within **Chapter 11: Cultural Heritage and Archaeology**.

Noise

2.5.25 For the purposes of early constraints mapping, avoidance buffers of 800m for wind turbines, and 500m for the substation compound were applied to residential properties in the vicinity of the Site.

2.5.26 Key noise sensitive receptors (residential properties) identified, which were considered when siting wind turbines, were Easter Cringate, and Cairnoch Lodge. Although these properties are financially involved in the Proposed Development, the predicted noise levels at these properties had the most bearing on the Proposed Development due to proximity to proposed wind turbines, and the existing operational wind farms to the north, west and east of these properties.

2.5.27 Effects upon noise sensitive receptors are assessed within **Chapter 13: Noise**.

Aviation and Radar

2.5.28 Aviation, covering all relevant radar installations, all navigational aids, air-ground-air communications stations and low flying activities, were an important consideration in the design of the Proposed Development.

2.5.29 Consultation with National Air Traffic Services (NATS) Safeguarding, and the Defence Infrastructure Organisation, has been carried out during the EIA process, particularly at EIA Scoping stage.



- 2.5.30 The design of the Proposed Development has considered wind turbine location and tip heights in combination with ground level (AOD), in order to ensure that there would be no negative effects on aviation assets.
- 2.5.31 As the proposed wind turbines are in excess of 150m to blade tip height, it is understood that visible aviation lighting would be required.
- 2.5.32 The Met Office radar at Holehead was also an important consideration when it came to wind turbine location and tip heights. Consultation with the Met Office in relation to this asset has been undertaken during the EIA process.
- 2.5.33 Aviation is considered further in **Chapter 14: Aviation**.

2.6 Design Evolution

Design Iterations

- 2.6.1 As detailed in Section 2.5, the initial potential development area within the Site, was refined using constraints mapping. These constraints (comprising various environmental, technical and landscape and visual constraints) were used to inform the evolution of the location of the proposed wind turbines and associated infrastructure. The design optimisation process was iterative, involving review of multiple layouts and related wirelines from key landscape and visual receptor locations in the study area, to minimise potentially adverse landscape and visual impacts insofar as possible, whilst also taking into consideration energy generation (e.g. wake loss) and other environmental, technical and economic considerations.
- 2.6.2 Two of the key design iterations are shown on **Figure 2.3** and comprise the Scoping layout (Layout A), and the Design Freeze Layout (Layout B: the Proposed Development). These two iterations represent key stages of the layout evolution, however several further 'interim' layouts were considered throughout the refinement process.
- 2.6.3 The factors that were considered as part of the design evolution process to achieve the final layout are described in the following paragraphs.

Wind Turbines

Layout A (Scoping Layout): 4 Wind Turbines at 200m Tip Height

- 2.6.4 A four wind turbine, 200m tip height layout was submitted to Stirling Council in September 2024, as part of an EIA Scoping request. At this stage, only a limited amount of design work or environmental assessment work had been conducted.
- 2.6.5 Following responses from Stirling Council and other consultees (including feedback from the public following the first round of public exhibitions), as well as further environmental and landscape feasibility work, it was considered appropriate to reduce the wind turbine blade tip heights from 200m to 180m. The reduced wind turbine tip height was deemed beneficial in a number of ways, including with regards landscape and visual considerations e.g. visibility from key viewpoints surrounding the Site, and also impacts on the nearby Met Office Holehead radar.

Layout B (Design Freeze – The Proposed Development): 4 Wind Turbines at 180m Tip Height

- 2.6.6 The design freeze layout was produced, taking into account the Scoping request responses, comments from the public, the final environmental and landscape and visual assessment work, and the further analysis on wake loss and yield.



- 2.6.7 In order to try and reduce the scale of the Proposed Development, the tip heights of the proposed wind turbines were reduced from 200m to 180m to reduce visibility of the Proposed Development on the closest residential and landscape receptors.
- 2.6.8 In addition, the wind turbine layout was moved northwards, away from the southern slopes of Cairnoch Hill facing Carron Valley Reservoir, in response to landscape and visual considerations identified through the iterative design process. This refinement was facilitated through the involvement of the Easter Cringate and Cairnoch Lodge properties in the Proposed Development.
- 2.6.9 The design freeze layout comprises four wind turbines of up to 180m to blade tip height. This layout includes for and incorporates the necessary rotor spacing requirements (ensuring longevity and efficiency of the wind turbines), based on a prevailing south westerly wind. In addition to this the wind turbines are positioned to minimise interaction with onsite constraints, including deeper peat, steep topography and watercourses.
- 2.6.10 The layout incorporates ancillary infrastructure elements including internal access tracks, substation compound, two temporary construction compounds, proposed crane hardstandings, an anemometry mast, and a borrow pit.

2.7 Other Infrastructure

Site Access

- 2.7.1 Access to the Site would be from the B818, via an upgraded existing junction at the south of the Site.
- 2.7.2 The proposed abnormal load route required to transport wind turbine components to the Site is shown on **Figure 12.2** and would be from the port of Grangemouth.

Site Tracks

- 2.7.3 The onsite access tracks largely utilise the existing forestry tracks. Where new sections of access tracks are required, these have been designed to be as direct / short as possible, whilst attempting to avoid crossing watercourses, avoid deep peat and also taking slope into account to ensure tracks are viable for construction and use.
- 2.7.4 Access tracks have been designed to follow routes which do not exceed gradients of 14%. This gradient is specified by a number of wind turbine manufacturers in their technical specifications to permit safe delivery of turbine components and associated parts. In addition to this, initial infrastructure design has confirmed that using an appropriate and proportional amount of cut and fill (see **Figure 2.2**) should allow access tracks to be constructed on gradients in line with manufacturers specifications.
- 2.7.5 Access tracks that would be utilised during the construction and operation of the wind farm would be 6m wide (with an additional 3m on either side of the tracks for drainage and cabling).

Borrow Pits

- 2.7.6 One borrow pit within the Site has been identified (see **Figure 3.1**). This borrow pit is an expansion of an existing FLS managed borrow pit.

Temporary Construction Compound

- 2.7.7 Two temporary construction compounds are proposed, one adjacent to the substation compound, and one towards the south west of the Site (see **Figure 3.1**). These locations are considered appropriate as they:



- Have appropriate topography (gradient);
- Are located in areas of shallow peat; and
- Avoid sensitive habitat areas.

Substation Compound

2.7.8 The proposed substation compound would be located at the north of the Site (see **Figure 3.1**). The location is considered appropriate as it:

- Has appropriate topography (gradient);
- Is located in an area of shallow peat;
- Avoids sensitive habitat areas; and
- Is located in excess of 500m from the nearest residential property.

2.7.9 The substation compound is located in excess of topple distance (200m) from the proposed wind turbines. The internal Site grid connection cables would be undergrounded within the Site from each turbine, to the control building, therefore avoiding visual impact.

Anemometry Mast

2.7.10 The proposed anemometry mast would be located approximately 400m west of Turbine no.3, at National Grid Reference (NGR) NS 69814 85468. This is the same location as a temporary anemometry mast which is currently in operation.

2.8 Micrositing

2.8.1 In order to be able to address any localised environmental sensitivities, unexpected ground conditions or technical issues that are found during detailed intrusive Site investigations and construction, it is sought that the consent includes provision for a 50m micrositing allowance for all proposed infrastructure. The technical assessments (presented in **Chapters 7 to 15**) have considered the potential for horizontal micrositing and it is considered that the proposed infrastructure could be micrositied (except within watercourse buffers) without resulting in potential significant effects, except where notable deep peat is identified. During construction, the need for any micrositing would be assessed and agreed with the onsite Environmental Clerk of Works.

2.9 Summary of Embedded (Primary) Mitigation

2.9.1 **Table 2-3** summarises the embedded (primary) mitigation incorporated in the Site layout of the Proposed Development.

Table 2-3: Embedded (Primary) Mitigation Measures

Reference	Mitigation Measure	Description
PM01	Wind turbines size and number	Size and scale of the development appropriate for its location
PM02	Using existing infrastructure	In so far as possible, existing onsite infrastructure e.g. forestry tracks and borrow pits, has been utilised and incorporated into the layout of the Proposed Development.
PM03	Watercourse buffer	Avoidance of siting any infrastructure within 50m of watercourses mapped on 1:50,000 OS mapping, with the exception of watercourse crossings.



PM04	Avoiding steep slopes	Avoidance of siting turbines on slopes greater than 14%.
PM05	Avoidance of deep peat	Avoidance of siting any infrastructure on deep peat (peat depth greater than 1.5m).
PM06	Reduced aviation lighting scheme	Proposal to the CAA of a reduced intensity lighting scheme for aviation safety, to minimise visual intrusion in hours of darkness.

2.10 Conclusion

- 2.10.1 The design process for the Proposed Development has been an iterative one, so that constraints identified throughout the EIA and layout design process could be avoided, and potential impacts from the Proposed Development avoided or reduced. Various technical, and environmental considerations were established by a combination of baseline surveys, assessment, and consultation with stakeholders.
- 2.10.2 The final layout of the Proposed Development is described in detail in **Chapter 3: Description of the Development** and shown on **Figure 3.1**.
- 2.10.3 The assessment of potential impacts of the resulting layout is addressed in **Chapters 7 to 15** of the EIA Report.

2.11 References

NatureScot (2017). Siting and Designing of Wind Farms in the Landscape: Version 3a. Available at: <https://www.nature.scot/doc/siting-and-designing-wind-farms-landscape-version-3a>

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2.12 Abbreviations List

Abbreviation	Meaning
AOD	Above Ordnance Datum
B818	Classified B Road 818
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
FLS	Forestry and Land Scotland
GPP	Guidance for Pollution Prevention



Abbreviation	Meaning
LNCS	Local Nature Conservation Site
LCT	Landscape Character Type
LVIA	Landscape and Visual Impact Assessment
MW	Megawatt
NGR	National Grid Reference
NPF4	National Planning Framework 4
NSA	National Scenic Area
NVC	National Vegetation Classification
PAC	Pre-Application Consultation
PWS	Private Water Supply
SAC	Special Area of Conservation
SLA	Special Landscape Area
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
UKHab	UK Habitat Classification



Making Sustainability Happen



Chapter 3: Description of the Development

Environmental Impact Assessment Report

Cairnoch Hill Wind Farm

3 August 2026



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Revision	Prepared By	Checked By	Approved By	Description
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3.0 Description of the Development

3.1 Introduction

- 3.1.1 This chapter describes the Proposed Development which is considered in this EIA Report. It sets out the way in which the Proposed Development would be constructed, including a description of the wind farm layout, its proposed scale, and the associated infrastructure.
- 3.1.2 The layout for the proposed development is shown on **Figure 3.1**. Information on construction methods are provided in **Technical Appendix 3.1: Outline Construction and Environmental Management Plan (CEMP)**. The outline CEMP illustrates the construction measures which are inherent in the project development and design, and which are therefore considered present at the outset of the environmental assessment.

3.2 Proposed Development

Scheme Overview

- 3.2.1 The Site (the area within the application boundary) is centred on (National Grid Reference) NGR NS 69768 85606 and covers an area of approximately 573ha. The characteristics of the Site are described in **Chapter 2: Design Evolution and Alternatives**.
- 3.2.2 The Proposed Development comprises four three-bladed horizontal axis wind turbines up to 180m tip height, with an indicative combined rated output in the region of up to 30MW. The Proposed Development also includes associated infrastructure including wind turbine foundations, crane hardstandings, new and upgraded access tracks, underground cabling, a Substation Compound including a control building, one borrow pit, two temporary construction compounds, and a permanent anemometry mast (see **Figure 3.1**).
- 3.2.3 In total, approximately 75.8ha of predominantly plantation conifer woodland would be felled as a result of the Proposed Development, with 34.4ha of this amount permanently lost. This permanent loss represents approximately 6% of the area of the Site.
- 3.2.4 The Proposed Development has been designed with an operational life of up to 40 years, at the end of which it would be decommissioned, or an application may be submitted to extend the life of the Proposed Development or repower the Site.
- 3.2.5 Each chapter of the EIA Report takes an appropriate and topic specific approach to assess the Proposed Development. The EIA Report provides a worst-case assessment for each discipline and presents enough information for consultees and the decision makers to comment on and determine the application. Each technical chapter has set out the degree to which the Proposed Development has been assessed, in order to provide a clear and robust assessment that allows for the necessary flexibility in relation to wind turbine procurement, post-consent. **Chapter 5: Environmental Impact Assessment**, provides further detail on the approach to assessment.
- 3.2.6 The key component parts of the Proposed Development include the following as detailed in **Table 3-1**.



Table 3-1: Proposed Development Key Components

Key Component	Detail
Wind Turbines	Four wind turbines including internal transformers, with blade tip heights of up to 180m.
Wind Turbine Foundations and Crane Hardstandings	Four wind turbine foundations (approximately 27m diameter) and associated crane hardstandings (approximately 99m x 35m and 1m in depth).
Access Tracks	Approximately 7.4km of upgraded access tracks, and approximately 2.3km of new access tracks. Both new and upgraded access track with running width widened to 6m (wider at bends), and a further 3m allowance on either side of the track for drainage / cabling.
Underground Cabling	Approximately 10km of underground cabling along access tracks to connect the wind turbine locations, and the onsite electrical substation.
Substation Compound	One onsite substation which would accommodate 33kV Switchgear to collect electricity from different parts of the Site. The substation compound would have an area of 75m x 100m and would include a control and metering building (approximately 16m x 11m and 5m high).
Borrow Pit	Use of one existing onsite borrow pit (working the borrow to a total area of approximately 1.82ha).
Anemometry Mast	One permanent anemometry mast up to 122.5m in height. The mast would have a main foundation area of approximately 3m x 3m, as well as four anchor points for supporting guy wires.
Temporary Construction Compounds	Two temporary construction compounds (12,000m ² and 4,000m ² respectively).

3.2.7 Typical details for the proposed turbines, foundations, access tracks, crane hardstandings, electrical infrastructure, borrow pit, anemometry mast, and temporary construction compounds are shown on **Figures 3.2 to 3.12**.

Access to Site

3.2.8 All access to the Site would be taken from the B818 via an upgraded entrance to the south of the Proposed Development.

3.2.9 The delivery of abnormal loads, such as wind turbine components, is expected to be from the port of Grangemouth, via Central Dock Road, A904 Earls Road, M9 to Junction 9, A872 south towards Dunipace, A872 Nethermain Road, and the B818 to the Site entrance.

3.2.10 The proposed abnormal load route was assessed and verified for wind turbine blades up to 86m. **Technical Appendix 12.1: Turbine Delivery Route Feasibility Assessment** identifies the areas where permanent or temporary road upgrades would be required. Any road improvements would be undertaken within this envelope.

3.2.11 Full detail of the assessment of the effects on the road network is provided in **Chapter 12: Traffic and Transport**.



Grid Connection

- 3.2.12 The Applicant is currently awaiting the outcome of the Gate 2 Variation Offer process (the Proposed Development has been confirmed as a Gate 2 project, however is still awaiting a formal Gate 2 offer) and, consequently, the connection point, route and infrastructure requirements remain unknown. The grid connection point for the Proposed Development is subject to confirmation by the network operator. The route of the grid connection cabling (or the form it would take, i.e. whether overhead lines, underground cables or a combination of both) has not been determined, meaning that its effects are not identifiable / assessable as it has yet to be designed and an application has not yet been made.
- 3.2.13 The Court of Session, in February 2026, issued a judgement on *Raeshaw Farms Limited v Scottish Ministers and Energiekontor* [2026] CSIH 10. The Court confirmed that decision makers must evaluate, on a case by case and fact specific basis, whether or not a wind farm and its grid connection form a single project for the purposes of EIA. Whilst this is for decision makers to consider and arrive at their decision, **Technical Appendix 3.3: Connection to the Electricity Grid - Raeshaw Farms Judgement**, provides detail to support this decision-making process.
- 3.2.14 Although **Technical Appendix 3.3** sets out an assessment of whether the Proposed Development and its grid connection can be considered to form a single project for EIA purposes, the Applicant is prepared to carry out a further proportionate assessment of the potential effects of the grid connection, at a point where sufficient information is available for it to do so.
- 3.2.15 The grid connection would require separate consent under Section 37 of the Electricity Act 1989. The grid connection application would be made by SP Energy Networks who are responsible for the transmission and distribution network in the area of the Proposed Development and who would own assets beyond the Site substation. Any cumulative impacts between the grid connection and the Proposed Development would be considered as part of the application made under Section 37 of the Electricity Act 1989.

Operational Life

- 3.2.16 It is anticipated that the Proposed Development would have an operational life of 40 years. At the end of this period, the Proposed Development would be decommissioned, or an application may be submitted to repower the Site. Details of infrastructure removal and restoration are provided in summary in **Table 3-5**.

3.3 Embedded Mitigation

- 3.3.1 A key benefit of the EIA process is the opportunity it provides to integrate environmental considerations into the careful, iterative design of the project. Embedded mitigation measures are those inherent in the Proposed Development and are integral to, and should be included in, consideration of the application.
- 3.3.2 Throughout the design evolution, the integration of embedded mitigation has been a significant aspect of the process that has shaped the final design of the Proposed Development. Consequently, this embedded mitigation forms part of the Proposed Development which is assessed.
- 3.3.3 During the construction of the Proposed Development, potential effects can be further mitigated through the adoption of 'best practice' working methods, supported by effective project management, the oversight of an Ecological Clerk of Works ("ECoW"), as well as adherence to the updated SEPA Guidance for Pollution Prevention (the GPP).



- 3.3.4 Reference to good practice, standards, guidelines, and legislation, relied upon in the assessment methodology are referred to within each individual specialist topic, in **Chapters 7 to 15**. These mitigation measures are also incorporated into the outline CEMP (**Technical Appendix 3.1**).

Design Principles

- 3.3.5 A number of design principles and environmental measures have been implemented and incorporated into the Proposed Development as standard practice described in **Chapter 2: Design Evolution and Alternatives**.
- 3.3.6 One of the key approaches to the design has been a desire to maximise the potential energy yield of the Site, whilst respecting environmental (including landscape and visual) constraints. Further details are set out in **Chapter 2** and the **Design and Access Statement (DAS)** submitted in support of the planning application.

Micrositing

- 3.3.7 Micrositing refers to the process of making small adjustments to the location of infrastructure elements within a defined area to respond to Site-specific conditions encountered during detailed design or construction.
- 3.3.8 During the construction process there may be a requirement to microsite elements of the Proposed Development infrastructure. This is an important measure which allows for further minimisation of environmental effects, under the supervision of the EnvCoW, where elements of the development can be moved to avoid areas of deep peat or other constraints, as more detailed information about Site conditions are understood. It is proposed that a 50m micrositing tolerance for wind turbines and all other infrastructure would be applied to the Proposed Development (so long as infrastructure does not move within 50m of any identified watercourse, or move closer to a watercourse where it is already within 50m). Within this distance, any change from the consented locations would be subject to approval of the EnvCoW as required, and in consideration of other known constraints. It is anticipated that the agreed micrositing distance may form a planning condition accompanying consent for the Proposed Development. The assessment of the Proposed Development has assumed a 50m horizontal micrositing allowance.

3.4 Consent Prior to Commencement of Construction

- 3.4.1 Prior to commencing construction on the Site, it may be necessary for the applicant to obtain a number of other statutory authorisations and consents to enable the Proposed Development to be implemented. Where relevant, these are covered in the technical chapters of this EIA Report.

3.5 Construction Phase

Construction Timetable

- 3.5.1 It is anticipated that construction of the Proposed Development would commence in late 2029 (subject to the length of the planning determination period) and would last approximately 16 months.
- 3.5.2 Construction would include the principal activities outlined in the indicative construction programme as provided in **Table 3-2**. The final detailed construction programme would be secured through the detailed CEMP and agreed with Stirling Council (and other relevant stakeholders).



Table 3-2: Construction Programme

Construction Activity	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Access Road Improvements																
Site Establishment																
Tree Clearance																
Construction of Tracks, Crane Pads and Compounds																
Turbine Foundation Construction																
Substation - Civil & Electrical works																
Turbine Delivery and Erection																
Cable Laying and Cable Bedding																
Site Restoration																



Construction Employment

- 3.5.3 The number of people employed during the construction period would vary depending on the stage of construction and the activities ongoing onsite. Workforce numbers are expected to be relatively low during the initial enabling works, such as access track formation and Site establishment, and will increase as construction progresses.
- 3.5.4 At peak construction activity - when civil engineering, electrical works, and wind turbine erection are occurring concurrently - it is expected that up to approximately 42 construction staff may be required on Site¹. This workforce will include a mix of civil engineers, electrical technicians, plant operators, environmental specialists, and support staff. The workforce will gradually reduce as construction activities are completed and the Site transitions into the commissioning and operational phases.
- 3.5.5 Where possible, local contractors and suppliers are to be engaged, in order to maximise economic benefits to the surrounding communities. Opportunities for local employment and supply chain involvement would be promoted through engagement with local business networks and supplier events.

Construction Hours

- 3.5.6 The construction working hours for the Proposed Development are set from 07:00 to 19:00, Monday through Friday, and from 07:00 to 16:00 on Saturdays. It should be noted that certain activities, such as abnormal load deliveries, concrete deliveries during foundation pours, and the lifting of wind turbine components, may need to take place outside of these specified hours (excluding Sundays). Any works beyond these activities, and outside the stated working hours, would not be undertaken without prior approval from Stirling Council. The principal contractor would be responsible for keeping local residents informed of the proposed working schedule, including the timing and duration of any particularly noisy or disruptive activities. These measures would be implemented as set out in **Chapter 12: Traffic and Transport**.

Construction Environmental Management Plan (CEMP)

- 3.5.7 An outline CEMP is provided as **Technical Appendix 3.1**. In acknowledgement that the CEMP is a live document that would evolve throughout the construction phase of the proposed development, only the principles of the CEMP are outlined at this stage. It is anticipated that submission and approval of a more detailed CEMP, following Site investigation works and further detailed design, would be the subject of a condition should consent for the Proposed Development be forthcoming.

Site Preparation and Establishment

- 3.5.8 Site preparation works, for the Proposed Development, would include the following key tasks, some of which would be undertaken concurrently:
- Ground investigation works;
 - Tree felling;
 - Set up of welfare facilities;
 - Formation of the temporary construction compound areas;
 - Establishment of borrow pit;

¹ Peak construction personnel numbers are based on professional judgement and experience of other similar projects



- Formation and upgrading of Site entrance and internal access tracks; and
- Initial groundworks and earthworks, including vegetation clearance and topsoil stripping in areas designated for infrastructure.

Temporary Construction Compound

- 3.5.9 Two temporary construction compounds would be required for the duration of the construction phase. The location of the temporary construction compounds are shown on **Figure 3.1**.
- 3.5.10 The temporary construction compounds would have a footprint of 80m x 50m and 100m x 120m respectively. The temporary construction compounds would contain the following:
- Temporary modular building(s) to be used as a Site office;
 - Welfare facilities;
 - Parking for construction staff and visitors;
 - Reception area;
 - Fuelling point or mobile fuel bowser;
 - Secure storage areas for tools; and
 - Waste storage facilities.
- 3.5.11 **Figure 3.9** illustrates an indicative temporary construction compound, although the layout may differ depending on Site topography and contractor requirements. Crane hardstanding areas, along with the construction compound, would be used for laydown during construction.
- 3.5.12 The buildings (e.g. welfare facilities, storage areas, offices and fuelling point) that form part of the temporary construction compound would be removed at the end of the construction phase.

Borrow Pits

- 3.5.13 One onsite borrow pit has been identified to provide material for the construction of the Proposed Development. The borrow pit is an existing Forestry and Land Scotland (FLS) managed borrow pit. The Proposed Development would see this borrow pit expanded in order to provide approximately 73,342m³ of material. The location of the borrow pit, and detail on excavation extents is provided in **Figures 3.1** and **10.6.1** respectively.
- 3.5.14 Quarrying this borrow pit is anticipated to provide a sufficient volume of rock/aggregate needed for the construction of the Proposed Development.
- 3.5.15 For the purposes of the EIA, the location, size, and nature of the borrow pit has been assessed.

Access Tracks

- 3.5.16 Approximately 9.7km of new and upgraded access track would be required to provide access to the wind turbines, substation, and temporary construction compounds (**Figure 3.1**). A total of approximately 2.3km of new track would be created, and approximately 7.4km of existing track would be upgraded.
- 3.5.17 New tracks would be unpaved and constructed of a graded local stone with a typical running width of 6m (wider on bends and at junctions). The tracks have been designed to include up to 3m on either side of the track for cabling, and potential ditches and



banks. The track would be wide enough for two vehicles to pass, however should this not be the case (e.g. during abnormal load deliveries), additional passing opportunities would be available using crane hardstandings and temporary construction compounds. Additionally, three turning heads would be constructed. It is anticipated that a large amount of the stone required for construction of the tracks and hardstanding areas could be won from the identified borrow pit.

- 3.5.18 **Figure 3.4** provides a typical illustration of the design of an onsite track. The design of tracks would take account of recognised good practice guidance as noted in **Technical Appendix 3.1: Outline CEMP**.
- 3.5.19 The existing Site access junction from the B818 would be upgraded to facilitate abnormal loads entering and exiting the Site. **Figure 3.12** provides the layout of the upgraded access junction.
- 3.5.20 Site visits have confirmed that deeper peat, of variable condition, is largely confined to the eastern edge of the Site. Access tracks (as well as other proposed Site infrastructure) have been designed so as to avoid areas of deep peat as far as possible. In areas where the peat is shallow, i.e. rockhead is less than 0.5m below the surface, then the track formation would be by cut and fill or by a cut operation where there is a slope.
- 3.5.21 The tracks would be left in place following construction to facilitate ongoing forestry operations and to provide access for maintenance, repairs, and eventual decommissioning of the Proposed Development. At the end of the construction period, the edges of all new tracks would be restored using materials stripped from excavations.
- 3.5.22 There are no new watercourse crossings that would be required as part of the Proposed Development, however there are six existing watercourse crossings that would be upgraded as part of the Proposed Development).
- 3.5.23 Details of the watercourse crossings to be upgraded are provided in **Table 3-3** and in **Technical Appendix 10.3: Schedule of Watercourse Crossings**.

Table 3-3: Onsite Watercourse Crossings

Watercourse Crossing	Coordinates	New / Existing
WX01	E 270280 / N 684521	Existing
WX02	E 270581 / N 685150	Existing
WX03	E 269155 / N 684983	Existing
WX04	E 268499 / N 685700	Existing
WX05	E 268546 / N 686179	Existing
WX06	E 269757 / N 684320	Existing

Tree Clearance

- 3.5.24 The Proposed Development would require 75.8ha of mostly conifer forest to be cleared. This is to facilitate the new access tracks, wind turbines, the Substation Compound, the temporary construction compounds, the borrow pit, and the anemometry mast. Any tree felling which is permanent and cannot be restocked due to the infrastructure footprint of the Proposed Development, would result in an equivalent amount of compensatory planting (likely to be off Site) being required.
- 3.5.25 In addition to the felling required in order facilitate the construction and operation of the Proposed Development, the felling of some other areas on Site is included in the



Technical Appendix 8.6: Outline Habitat Management Plan (HMP). The Outline HMP proposes that some areas be felled for biodiversity enhancement purposes, such as native tree planting, and pond areas / buffers.

- 3.5.26 **Technical Appendix 3.2: Forestry** outlines the specific breakdown of forest species and the areas on Site where felling would be required. Harvesting operations would take place early on in the construction programme and outwith the bird breeding season.
- 3.5.27 It is expected that suitably worded planning conditions would be appropriate for managing the production and agreement of a forest felling plan, and also for managing and agreeing the scale and location of compensatory planting required.

Lighting

- 3.5.28 Artificial lighting may be required during the construction phase to ensure safe working conditions, during periods of limited natural light. Examples include vehicle and plant headlights, construction compound lighting, floodlights and mobile lighting units, to be used around specific construction activities. It is intended that the type of lighting would be non-intrusive (e.g. directed towards works activity and away from the application boundary), to minimise impact on nearby properties and any other environmental considerations.

Materials Sourcing and Waste Management

- 3.5.29 For construction, the Proposed Development would require a range of materials (e.g. stone for access tracks, the temporary construction compounds and the Substation Compound). Excavated material from the wind turbine bases and access tracks would be used onsite for restoration/reinstatement.
- 3.5.30 A Site Waste Management Plan would be developed for implementation during construction, as discussed in the outline CEMP (**Technical Appendix 3.1**). This outlines the material requirements and waste generation during construction and how the applicant intends to consider the management of these aspects.
- 3.5.31 Concrete would be batched onsite at the construction compounds for which water would be required. There may be potential to use water mains, or alternatively a location for a borehole would be required to be found onsite.
- 3.5.32 Water would also be required for welfare facilities and to dampen the track during dry weather, although this would be minimal and an abstraction license is not anticipated to be required for the activity.

Wind Turbine Layout

- 3.5.33 The Proposed Development is for four horizontal axis wind turbines. The proposed wind turbine locations are shown on **Figure 3.1** and the coordinates for each are provided in **Table 3-4**.

Table 3-4: Wind Turbine Coordinates

Turbine No.	Easting	Northing	Tip Height (m)	AOD (m)
1	269183	686380	180	305
2	269514	685957	180	368
3	270220	685551	180	374
4	270707	685384	180	306



Wind Turbines and Transformers

- 3.5.34 The exact model of the wind turbines to be installed at the Proposed Development would be selected through a competitive procurement process and would be dependent upon technology available at that time. This EIA Report has considered the use of indicative wind turbine types as shown on **Figure 3.2**.
- 3.5.35 It is anticipated that the wind turbines would be rated between approximately 5MW to 7.5MW. A realistic anticipated capacity for the Proposed Development would be in the region of 20MW to 30MW based on current wind turbine availability.
- 3.5.36 The wind turbines would each incorporate a tapered tubular tower and three blades attached to a nacelle that would house a turbine generator and other operating equipment e.g. a gear box. The wind turbines would be semi-matt pale grey (in line with RAL 7038) or a finish agreed with Stirling Council.
- 3.5.37 For the purposes of the assessment, it is assumed that each wind turbine would be served by an electrical transformer that would be located internally.
- 3.5.38 Details of the final wind turbine model selected would be presented to Stirling Council, as part of the final setting out plans during the discharge of planning conditions, in the event of consent being granted.

Foundations and Crane Hardstandings

- 3.5.39 Wind turbine foundations would be designed to accommodate the final choice of wind turbines and to suit Site specific ground conditions. The final design specification for each foundation would depend on the findings of detailed ground investigation of the land on which each wind turbine would be located. An illustration of a typical wind turbine foundation is provided on **Figure 3.3**.
- 3.5.40 The wind turbines are expected to have gravity foundations laid using reinforced concrete and would have a diameter of approximately 27m.
- 3.5.41 Depth of the excavation would depend on the need to reach suitable ground. Excavations would be, on average, approximately 2.5m deep.
- 3.5.42 The sides would be graded back, from the foundation and battered to ensure that they remain stable during construction.
- 3.5.43 The wind turbines would be erected using mobile cranes brought to the Site for the construction phase. A crane hardstanding would be built adjacent to each wind turbine and would have an estimated permanent footprint of approximately 99m x 35m and 1m in depth (with additional areas for the boom supports and blade storage trestles). The actual crane pad design and layout would be determined by the wind turbine supplier according to their preferred erection method. An indicative design, considered to be the worst-case in terms of size, has been considered for the purposes of this assessment and is provided on **Figure 3.5**.
- 3.5.44 The crane hardstanding would also be utilised as a laydown area. These areas would remain in situ for the duration of the operational phase of the Proposed Development.
- 3.5.45 Soils that are excavated during construction would be set aside for backfilling the batter areas around the wind turbine bases and hardstandings and use of small bankings either side of access tracks.

Onsite Substation Compound and Electrical Cabling

- 3.5.46 The Proposed Development would be connected to the electricity network via an onsite substation control building located within the Substation Compound (approximately 75m x 100m). The Substation Compound would include an area for car parking and



High Voltage (HV) equipment, such as transformers and circuit breakers as well as a control building. This indicative onsite Substation Compound is shown on **Figure 3.7**.

- 3.5.47 The main control building would be single storey, built on a pre-cast concrete base and would measure approximately 16m x 11m and 5m high (pitched roof which would be 5m high at its tallest point). It is proposed that the buildings would have a rendered finish; the final external finishes would be agreed with Stirling Council, via condition, in the event of consent being granted. A typical control building elevation is shown on **Figure 3.8**.
- 3.5.48 Underground power cables would run along the side of the access tracks in trenches from each of the wind turbines to the substation. Indicative cable trench arrangements are provided on **Figure 3.6**.

Anemometry Mast

- 3.5.49 One permanent anemometry mast, up to 122.5m in height, is included as part of the Proposed Development. The permanent anemometry mast would be located at the same location on Site as a current temporary anemometry mast (NGR NS 69814 85468). used to monitor wind and weather conditions in order to allow for the safe and efficient operation of the proposed wind turbines (**Figure 3.10** and **3.22**).

Site Signage (Construction)

- 3.5.50 During construction, the Site will have suitable signage to ensure that contractors use the correct roads, and also to protect the health and safety of workers, contractors and the general public. Signage will provide the operator's name, the name of the Development and an emergency contact telephone number. The exact final locations and design of the signage will be defined prior to construction commencing.

Site Restoration Post Construction

- 3.5.51 Soils would be used for reinstatement works associated with access tracks, cable trenches, wind turbine foundations, crane hardstandings, borrow pits and the temporary construction area. The upper vegetated turfs would be used to dress infrastructure edges, and to reinstate the surface of restoration areas. It is anticipated that most of the soil resources within areas directly affected by construction activities would be able to be stored and reinstated as close as possible to where they were excavated, in accordance with best practice; so that the Site would be restored with minimal movement of material from its original location. It is not anticipated that any excavated material would leave the Site.
- 3.5.52 Further detail on Site restoration would be provided within the CEMP, an outline of which is provided in **Technical Appendix 3.1**.

3.6 Operation and Maintenance Phase

Duration

- 3.6.1 The Proposed Development would have an operational life of up to 40 years from the first commissioning (export to the electrical grid).

Electricity Generation

- 3.6.2 The wind turbines would start to generate electricity at wind speeds of around 2.5m/s (5.6mph). Electricity output would increase as the wind speeds increase up to a maximum of around 13m/s (29.1mph), when the wind turbines would reach their maximum capacity. The wind turbines would continue to operate at maximum capacity up to wind speeds of around 28m/s (62.6mph). Above 28m/s the wind turbines would



operate at a reduced output under a storm-control mode up to wind gusts of around 50m/s (112mph). Above 50m/s, the wind turbines would cut-out and automatically stop as a safety precaution.

- 3.6.3 The total generating capacity of the Proposed Development could be up to 30MW depending on the final wind turbine model selected, however using a conservative estimate of 20MW (assuming a 5MW wind turbine rating) of installed capacity for the Proposed Development, it would produce an average of approximately 70,000 megawatt-hours (MWh) of electricity annually (based on a Site derived capacity factor of 40%). This equates to the equivalent electricity consumed by approximately 21,000 average UK households².

Maintenance

- 3.6.4 The Proposed Development would largely be controlled and managed remotely, however, there would be technicians on Site regularly and it would be maintained throughout its operational life via servicing at regular intervals. It is anticipated that there would be approximately four annual service visits per wind turbine by a service team of up to three people. Inspections of high-voltage equipment and general site safety are expected to be carried out monthly. Faults would be responded to as required, most likely by a team of two technicians.
- 3.6.5 This team would either be employed directly by the developer or in partnership with the wind turbine manufacturer. Management of the wind farm would typically include wind turbine maintenance, health and safety inspections, and annual civil maintenance of tracks, drainage and buildings. Wind turbine maintenance includes the following:
- Annual civil maintenance of tracks and drainage;
 - Scheduled routine maintenance and servicing;
 - Unplanned maintenance or call outs;
 - HV and electrical maintenance; and
 - Wind turbine blade inspections.

Habitat Management Plan

- 3.6.6 As part of the Proposed Development there are a number of measures proposed, which would enhance, restore, and create onsite habitat for various species. These proposals are set out in **Technical Appendix 8.6: Outline Habitat Management Plan**, and include:
- Native woodland;
 - Planting 15.46ha of broadleaf woodland creation.
 - 8.81ha of wet woodland management.
 - Riparian zones;
 - 11.83ha of riparian improvement.
 - Restoration of peatland;
 - 13.71ha of peatland restoration.
 - 13.92ha peatland buffer around broadleaf woodland creation areas.

² Calculated using the most recent statistics from Department of Energy Security and Net Zero (DESNZ) showing that annual GB average domestic household consumption is 3,323kWh (as of December 2025).



- Pond creation and improvement;
 - Improvement of existing ponds totalling approximately 0.03ha.
 - Creation of new ponds totalling approximately 0.02ha.
 - Buffers around ponds of approximately 1.36ha.
 - Connection corridors between ponds totalling approximately 0.18ha.
- Provision and maintenance of wildlife boxes/nests; and
 - Various locations across the Site targeting pine marten, reptiles, amphibians, bats, barn owls, and woodland birds.
- Invasive species removal;
 - Removal of giant hogweed.

Community Benefit

- 3.6.7 Should the Proposed Development gain consent, a Community Benefit Fund would be made available to the communities in proximity to the development. This is offered on the basis of a payment per MW of installed wind capacity at the Scottish Government recommended rate. At present, the recommended rate is £5,000 per MW. It is estimated that, the community benefit fund alone would accrue benefits to the local economy of between approximately £4 million and £6 million over the 40-year life of the wind farm.
- 3.6.8 The applicant would look to explore potential models for part community shared ownership of the Proposed Development, whereby the local communities would have the opportunity to invest into the project in line with the Scottish Government's Good Practice Principles for Community Benefits from Onshore Renewable Energy Developments.

Decommissioning Phase

- 3.6.9 At the end of its operational life, which would be defined by condition on the grant of any consent, the Proposed Development would be decommissioned unless an application is submitted to extend the operational period or to repower the Site. The decommissioning period would be expected to take up to 12 months.
- 3.6.10 The ultimate decommissioning protocol would be agreed with Stirling 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 Decommissioning and Restoration Plan (DRP). It is anticipated that the DRP would be the subject of a planning condition.
- 3.6.11 The final, detailed, DRP would reflect the relevant legislation, and best practice current at the time of decommissioning and restoration.
- 3.6.12 As decommissioning effects are, based on current information and guidance, not expected to exceed those at construction phase (for any technical topic), further detailed assessment of decommissioning effects has been scoped out of this EIA. More detail on this is provided in **Chapter 6: Scoping and Consultation** and in each technical topic chapter (**Chapters 7 to 15**).
- 3.6.13 **Table 3-5** sets out the potential decommissioning requirements for each element of the proposed development. These would be outlined further in the outline DRP and then updated in the detailed DRP.



Table 3-5: Decommissioning Requirements for Infrastructure / Decommissioning Statement

Element	Decommissioning and Requirement
Wind Turbines	Turbines would be dismantled and removed from site. Turbine components would be dismantled onsite using standard engineering techniques similar to those used for the original installation. The re-use or recycling of components would be prioritised, this would include exploration of any viable second hand turbine market. Turbine oils or any other oils would be removed from the site and disposed of appropriately.
Turbine Foundations	Top soil material that has revegetated the foundations would be excavated first and temporarily stored for re-use following partial removal of foundations. The top 1m of the turbine foundation would be removed and disposed of appropriately. This is considered preferential to removing all infrastructure, due to the potentially lower environmental impacts associated with excavating, processing and removing concrete from the Site. The excavated foundation would be reprofiled with soil and reseeded.
Crane Hardstandings	Top soil material that has revegetated the crane hardstandings would be excavated first and temporarily stored for reuse following partial removal of crane hardstandings. The top 1m of the crane hardstandings would be removed and disposed of appropriately. This is considered preferential to removing all infrastructure, due to the potentially lower environmental impacts associated with excavating, processing and removing aggregate from the site. The excavated hardstandings would be reprofiled with soil and reseeded. Recovered geogrids and geotextiles would be disposed of appropriately. All granular materials would be excavated and removed from the site, for re-use where practicable.
Access Tracks	Access tracks would be left in-situ, which would reduce potential environmental impacts associated with potential sediment migration into watercourses as a result of removing all tracks.
Watercourse Crossings	These would remain in-situ in association with the access tracks after decommissioning. This would reduce decommissioning activities in the vicinity of watercourses and thus potential for contamination as a result of run-off.
Underground Cabling	These are underground and therefore all cables would be made safe and left in-situ. This is considered preferential to extracting cables from the cable trenches due to the potentially greater environmental impacts associated with excavating, processing and removing the cable from the Site.
Substation compound	All equipment from within the substation compound would be removed from site and either reused, recycled or disposed of appropriately. Oils or lubricants from the compound would be removed and disposed of appropriately. The control building, and related infrastructure, would then be demolished and all materials would be reused, recycled or disposed of appropriately.
Substation Compound Foundation	The top 1m of the compound foundations would be removed and disposed of appropriately. The excavated hardstandings would be reprofiled with soil and reseeded.

3.7 References

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3.8 Abbreviations List

Abbreviation	Meaning
AOD	Above Ordnance Datum
B818	Classified B Road 818
CEMP	Construction and Environmental Management Plan
DAS	Design and Access Statement
DRP	Decommissioning and Restoration Plan
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EnvCoW	Environmental Clerk of Works
FLS	Forestry and Land Scotland
GPP	Guidance for Pollution Prevention
HMP	Habitat Management Plan
HV	High Voltage
MW	Megawatt
MWh	Megawatt hour
NGR	National Grid Reference
PPG	Pollution Prevention Guidelines



Making Sustainability Happen



Chapter 4: Policy Context

Environmental Impact Assessment Report

Cairnoch Hill Wind Farm

3 August 2026



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Revision	Prepared By	Checked By	Approved By	Description
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4.0 Policy Context

4.1 Introduction

- 4.1.1 This Chapter identifies the climate change, energy and planning legislation, policies and targets relevant to the determination of the planning application for the proposed Cairnoch Hill Wind Farm (the “Proposed Development”).
- 4.1.2 It is important to note that it is not the purpose of this chapter to provide an assessment of the Proposed Development against these climate change, renewable energy and planning policies and targets. Instead, it outlines the context in which the Proposed Development should be considered, including the urgent need case for rapidly increased renewable energy generation over the next decade in response to the global climate emergency. More detailed analysis and assessment of the Proposed Development against these policies and other material considerations is contained in the separate supporting Planning Statement which accompanies this application.
- 4.1.3 This Environmental Impact Assessment (EIA) Report has been prepared to support a planning application for the Proposed Development, which will be determined under the Town and Country Planning (Scotland) Act 1997, as amended (the “Planning Act”).
- 4.1.4 When determining planning applications submitted under the Planning Act, a decision maker must have regard to the Development Plan unless material considerations indicate otherwise (Section 25 of the Planning Act). The Development Plan for the Proposed Development comprises the National Planning Framework 4 (NPF4) and the Stirling Local Development Plan 2 (LDP2). The Applicant has sought to develop a scheme that aligns with national and local planning policy, including the spatial strategy, renewable energy, and climate objectives contained within NPF4 and LDP2.
- 4.1.5 The application will be submitted to the Stirling Council, and this EIA Report forms a key part of the supporting documentation. In accordance with the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017, the EIA Report presents the findings of the assessment of likely significant environmental effects arising from the construction, operation, and decommissioning of the Proposed Development. The applicant has sought to design the Proposed Development in a way that minimises environmental impacts and reflects the duties set out in relevant planning and environmental legislation. The EIA process has informed the design evolution of the Proposed Development, and its findings are presented within this EIA Report to support Stirling Council’s consideration of the application.
- 4.1.6 **Technical Appendix 4.1: Legislation, Planning Policy and Guidance**, provides a summary of specific relevant legislation, planning policy and guidance for each technical discipline considered in the EIA Report.

4.2 Policy on Climate Change and Energy

International Commitments and Agreements

- 4.2.1 In order to understand the need for a continuing increase of renewable energy generation in Scotland, it is important first to understand the international framework towards tackling climate change. The key targets and obligations in this regard are outlined below.

The COP21 UN Paris Agreement

- 4.2.2 On 12 December 2015 delegates from nearly 200 different countries gathered at the Paris Climate Conference (“COP21”) and adopted a legally binding international



agreement – known as “the Paris Agreement” – by which all countries vowed to cut their carbon emissions. They agreed:

- A long-term goal of keeping the increase in global average temperature to well below 2 degrees Celsius (°C) above preindustrial levels;
- To aim to limit the increase to 1.5°C, since this would significantly reduce risks and the impacts of climate change;
- On the need for global emissions to peak as soon as possible, recognising that this will take longer for developing countries; and
- To undertake rapid reductions thereafter in accordance with the best available science, so as to achieve a balance between emissions and removals in the second half of the century.

4.2.3 Under the agreements, countries are also legally obliged to make new post-2030 commitments to reduce emissions every five years. The Paris Agreement does not itself represent government policy in the UK or Scotland. However, the purpose of domestic and renewable energy and greenhouse gas reduction targets is to meet the UK’s commitment in the Paris Agreement.

COP26 Glasgow

4.2.4 In addition to the Paris Agreement, consideration should also be given to the UN Climate Change Conference of the Parties (COP26) event held in Glasgow in November 2021. At the conference there was worldwide consensus on the severity of the current climate emergency with a particular recognition of the loss and damage that the current impacts of climate change. Following two weeks of intense talks, nearly 200 countries agreed to the Glasgow Climate Pact to continue to pursue efforts to limit global average temperature increases to 1.5°C in accordance with the Paris Agreement. All countries also agreed to speeding up the pace of climate action this decade and to revisit and strengthen their current emissions targets to 2030. These outcomes further emphasise the importance of rapidly increasing renewable energy generation capacity over the next decade in response to the global climate emergency.

COP28 Dubai

4.2.5 More recently, at COP28 held in Dubai at the end of 2023 concluded with an agreement that signals the “*beginning of the end*” of the fossil fuel era. Agreement was reached on the world’s first “*global stocktake*” which recognises that science indicates that global greenhouse gas emissions need to be cut by 43% by 2030 (compared to 2019 levels) in order to limit global warming to 1.5°C. The “global stocktake” recognises that Parties are off track when it comes to meeting their Paris Agreement goals and calls on Parties to take actions towards achieving, at a global scale, a tripling of renewable energy capacity.

COP29 Baku

4.2.6 COP29 took place in Baku in November 2024. COP29 worked on enabling the pledges made during COP28 (including a tripling of global renewable energy capacity by 2030) through climate finance agreements.

COP30 Belém

4.2.7 COP30 took place in Belém, Brazil in November 2025. COP30 advanced momentum on renewable energy, reaffirming the global goal to triple renewable energy capacity by 2030 as part of the Belém Political Package, while launching a coordinated \$1 trillion



plan to expand and strengthen power grids to support large-scale clean energy deployment.

UN Emissions Gap Report (November 2025)

- 4.2.8 The 16th and most recent UN Emissions Gap Report was published in November 2025. The report tracks global efforts in limiting warming and reflects on progress since the adoption of the Paris Agreement, marking ten years since its introduction.
- 4.2.9 The report sets out the current international position on climate change, with the key findings being inter alia:
- Global greenhouse gas emissions continued to rise in 2024;
 - While the projected global temperature increase for this century has fallen slightly, the reduction is not sufficient to avoid a significant escalation in climate-related risks and damages; and
 - Nations remain far from meeting the Paris Agreement goal of limiting warming to well below 2°C. The lack of stringent mitigation action to date means that pathways limiting warming to 1.5°C now involve higher levels of overshoot.
- 4.2.10 The report concludes that this overshoot must be minimised through faster and deeper cuts in greenhouse gas emissions to reduce climate risks and damages, and to keep the possibility of returning to 1.5°C by 2100 within reach, although doing so will be extremely challenging.
- 4.2.11 It emphasises that immediate mitigation is required, particularly through expanded wind and solar deployment, which continues to benefit from falling costs and growing market uptake and is central to combatting climate change. However, current deployment levels remain insufficient, and achieving accelerated emissions reductions will require overcoming significant policy, governance, institutional, and technical barriers. In this context, the Proposed Development is therefore considered timely.

UK Context

- 4.2.12 Although the overarching position in the UK is that energy policy is not a devolved matter, the UK Government have made it clear that the devolved administrations must play an important role in helping the UK meet international and EU climate change targets. The key UK targets in this regard are outlined below.

Net Zero: The UK's Contribution to Stopping Global Warming (2019)

- 4.2.13 At COP21, the Intergovernmental Panel on Climate Change (IPCC) was invited to publish a report on the impacts of global warming of 1.5°C and associated greenhouse gas emissions pathways. The IPCC released their report (the "Special Report") on 8 October 2018. In response to the IPCC's Special Report, the UK Government requested advice from the Committee on Climate Change (a non-departmental public body that advises the UK Government on the climate) on the implications of the Paris Agreement. This included requesting advice on what further action was needed to meet the goals of the Paris Agreement.
- 4.2.14 On 2 May 2019 the Committee on Climate Change published their advice in 'Net Zero: the UK's Contribution to Stopping Global Warming'. The report made the following recommendations:
- UK overall: a new tougher emissions target of net zero greenhouse gases by 2050, ending the UK's contribution to global warming within 30 years. This would replace the previous target of an 80% reduction by 2050 from a 1990 baseline;



- Scotland: a target of net zero greenhouse gases economy by 2045, reflecting Scotland's greater relative capacity to remove emissions than the UK as whole; and
 - A net zero greenhouse gases target for 2050 would deliver on the commitment that the UK made by signing the Paris Agreement.
- 4.2.15 In terms of the new net-zero targets, the report at page 11 makes it clear for the entirety of the UK that *"this is only possible if clear, stable and well-designed policies to reduce emissions further are introduced across the economy without delay"*. It continues that *"current policy is insufficient for even the existing targets"*.
- 4.2.16 The Committee on Climate Change report sets out various scenarios for UK net zero greenhouse gases in 2050. These include one of extensive electrification, particularly of transport and heating. Page 23 of the Executive Summary states that this would need to be *"supported by a major expansion of renewable and other low carbon power generation. The scenarios involve around a doubling of electricity demand, with all power produced from low carbon sources (compared to 50 % today)"*.
- 4.2.17 The Committee on Climate Change scenarios for electricity generation estimate that to keep the UK on track to meet its net zero target, that renewable energy deployment will require a fourfold increase across the UK from current levels. It identifies that this quadrupling of renewable energy will require approximately 22 to 29 gigawatts (GW) of onshore wind capacity by 2030 and solar capacity increased to 23 to 43 GW. Currently, capacity for both is approximately 13 to 14 GW each.
- 4.2.18 The technical annex to the report specifically addresses integrating variable renewables into the UK electricity system. The annex makes it clear that variable renewable electricity such as large-scale onshore wind energy is now the cheapest form of electricity generation in the UK and can be deployed at scale to meet UK electricity demands.
- 4.2.19 The report's 'further ambition scenario' for the power sector aims to see low-carbon sources providing 100% of power generation in 2050, with variable renewable sources (including onshore wind) anticipated to contribute some 57% of this total low carbon power generation.
- 4.2.20 The UK targets in the report have since been legislated by the Climate Change Act 2008 (2050 Target Amendment) Order 2019, which amended the Climate Change Act 2008. This came into force on 27 June 2019. Since then the IPCC have released further reports on the impacts of climate change. The most recent report being the 'Synthesis Report of the IPCC Sixth Assessment Report (AR6)' which integrates the main findings of the Sixth Assessment Report (AR6) and the associated three Special Reports (including the 2018 Special Report detailed in paragraph 4.2.13 above). With regards current progress (globally) in climate change adaptation planning and implementation, the 'Synthesis Report of the IPCC Sixth Assessment Report (AR6)' states at A.3 the following:
- "Adaptation planning and implementation has progressed across all sectors and regions, with documented benefits and varying effectiveness. Despite progress, adaptation gaps exist and will continue to grow at current rates of implementation. Hard and soft limits to adaptation have been reached in some ecosystems and regions. Maladaptation is happening in some sectors and regions. Current global financial flows for adaptation are insufficient for, and constrain implementation of, adaptation options, especially in developing countries"*.
- 4.2.21 With regards future climate change, the 'Synthesis Report of the IPCC Sixth Assessment Report (AR6)' states at B.1 the following:



“Continued greenhouse gas emissions will lead to increasing global warming, with the best estimate of reaching 1.5°C in the near term in considered scenarios and modelled pathways. Every increment of global warming will intensify multiple and concurrent hazards”.

The Sixth Carbon Budget

- 4.2.22 In December 2020 the Committee on Climate Change published ‘The Sixth Carbon Budget’, describing what the potential path options to net zero by 2050 look like and detailing the steps that must be taken to achieve this.
- 4.2.23 A key recommendation of the report is that the UK Government requires a reduction in UK territorial greenhouse gases of 78% by 2035 relative to 1990 levels. The report advises that this can be done through the following four steps:
- Take up of low carbon solutions;
 - Expansion of low carbon energy supplies including onshore wind;
 - Reducing demand for carbon intensive activities; and
 - Land and greenhouse gas removals.
- 4.2.24 Key benefits for the UK are seen as including the opportunity for low carbon investment, recognised at a time when it is needed to support the UK’s economic recovery from the COVID-19 health crisis.
- 4.2.25 Page 23 refers to the devolved nations and sets out that *“UK climate targets cannot be met without strong policy action across Scotland, Wales and Northern Ireland, tailored for national, regional and local needs”*. The report recognises that although the main policy levers are held by the UK Government, Scotland can take action through complementary measures at the devolved level including supporting policies such as “planning and consenting”.

British Energy Security Strategy (2022)

- 4.2.26 The British Energy Security Strategy policy paper was published in April 2022. The strategy identifies that if the UK is to reduce rapidly increasing energy bills and keep them down for the long term, the UK needs to reduce its dependence on imported oil and gas and to source more of its energy domestically instead.
- 4.2.27 Whilst primarily focusing on offshore wind rather than onshore wind, the strategy highlights that onshore wind is one of the cheapest forms of renewable power, and advises that improvements will be made to infrastructure UK wide, in order to facilitate more onshore wind development. The strategy seeks to increase deployment of wind and solar energy, and identifies that it expects the measures detailed in the strategy to result in an electricity generation mix that is 95% low carbon electricity by 2030.

Energy Act 2023

- 4.2.28 The Energy Act 2023 received Royal Assent on 26 October 2023. The 2023 Act, which was originally introduced as the Energy Security Bill in 2022, seeks to build on the commitment set out in the April 2022 British Energy Security Strategy to reduce the UK’s dependence on fossil fuel markets, by improving domestic energy production and making the UK more self-sufficient with regards energy use.
- 4.2.29 Following the introduction of the 2023 Act into law, the Energy Security Secretary at the time Claire Coutinho commented that the *“Energy Act is the largest piece of energy legislation in a generation. It will boost investment in clean energy technologies and support thousands of skilled jobs across the country. It lays the foundations for greater*



UK energy independence, making us more secure against tyrants like Putin, and helps us to power Britain from Britain”.

Climate Change Committee Progress Report to Parliament (2025)

- 4.2.30 The most recent Climate Change Committee’s progress reports to Parliament ‘Progress in reducing emissions’ was published in June 2025. As with previous reports, it restates the need for renewable energy and stronger actions on reducing emissions. In the Executive Summary to the report it sets out that *“The UK has an ambitious target to reduce emissions by 68% on 1990 levels by 2030, our Nationally Determined Contribution (NDC) to the Paris Agreement and the first UK target consistent with achieving Net Zero in 2050. This target is within reach, provided the Government stays the course. Progress to date has been primarily driven by decarbonisation of the electricity system, with renewables replacing both coal and, increasingly, gas. Future progress will require a broader change, especially using low-carbon electricity to replace oil and gas in surface transport, heat in buildings, and industry, alongside nature-based solutions such as tree planting, and engineered removals.”*

Clean Power 2030 Action Plan (2024)

- 4.2.31 The Clean Power 2030 Action Plan set out the UK Government’s strategy for delivering a secure, affordable and low-carbon power system by 2030. Developed with the Scottish Government, the plan sets ambitious renewable energy deployment goals, including 27-29GW of new onshore wind, alongside wider reforms to support clean energy investment and reduce greenhouse gas emissions.
- 4.2.32 The 2030 Action Plan adds that *“Meeting the clean power 2030 goal is key to accelerating to net zero, not only in eliminating emissions that currently come from electricity generation, but also via the application of clean power in the buildings, transport and industry sectors... The shift to a clean power system by 2030 forms the backbone of the transition to net zero, as we move to an economy much more reliant on electricity”.*

Onshore Wind Pipeline 2025 Report

- 4.2.33 The Onshore Wind Pipeline Report published by Renewable UK in September 2025 identifies onshore wind as central to the UK’s clean energy transition, highlighting both the sector’s resilience and continued growth. The report notes that the national pipeline has expanded to more than 47GW, with 15.8GW of onshore wind capacity currently operational. While this represents notable progress, the report also identifies a significant gap between the UK’s current installed capacity and the level required to meet the 2030 onshore wind ambitions set out in the Clean Power 2030 Action Plan referenced above.

Scotland Context

The Climate Change (Scotland) Act 2009

- 4.2.34 The Climate Change (Scotland) Act 2009 initially established long term statutory targets for Scotland of reducing greenhouse gas emissions by at least 80% by 2050, with an interim target of reducing emissions by at least 42% by 2020. The Act also placed climate change duties on Scottish public bodies and included provisions on climate change including adaption, forestry, energy efficiency and waste reduction.
- 4.2.35 Section 44 of the 2009 Act places climate change duties on Scottish public bodies. It sets out that a public body must, in exercising its functions, act: in the way best calculated to contribute to the delivery of Scotland’s climate change targets; in the way



best calculated to help deliver any Scottish adaption programme; and in the way that it considers most sustainable". This means that all public sector organisations, including the Scottish Ministers and local planning authorities, are obliged in exercising their functions to do so in a manner which is consistent with meeting the net zero climate change target.

Scottish Energy Strategy (2017)

- 4.2.36 The Scottish Energy Strategy (SES) was published in 2017 and was therefore also prepared in the context of the lower greenhouse gas emissions targets set initially under the Climate Change (Scotland) Act 2009. There is a Draft Energy Strategy and Just Transition Plan which will update SES, however until this has been published SES remains the most recent strategy. SES sets out the Scottish Government vision for the future energy system in Scotland for the period through to 2050. SES identifies that Scotland's long-term climate change targets will require the near complete decarbonisation of our energy system by 2050, with renewable energy meeting a significant share of our needs.
- 4.2.37 The SES sets a target for the equivalent of 50% of the energy for Scotland's heat, transport and electricity consumption to be supplied from renewable sources by 2030. This 50% target roughly equates to of 17 GW of installed capacity in 2030. The latest figures on the Scottish Government's Energy Statistics Hub identify that in 2023, 29.5% of total Scottish energy consumption came from renewable sources.
- 4.2.38 Alongside these energy targets, the SES also sets out six strategic priorities. These include:
- *"System security and flexibility – we should have the capacity, the connections, the flexibility and resilience necessary to maintain secure and reliable supplies of energy to all of Scotland's homes and businesses as our energy transition takes place."*
 - *"Renewable and low carbon solutions – we will continue to champion and explore the potential of Scotland's huge renewable energy resource, and its ability to meet our local and national heat, transport and electricity needs – helping to achieve our ambitious emissions reduction targets."*
- 4.2.39 The SES advises that onshore wind energy development is essential to Scotland's transformation to a fully decarbonised energy system by 2050 and brings opportunities which underpin our vision to grow a low carbon economy and build a fairer society.

The Climate Emergency Declaration (2019)

- 4.2.40 At the SNP Conference in April 2019, Scotland's First Minister declared a climate emergency:
- "As First Minister of Scotland, I am declaring that there is a climate emergency. And Scotland will live up to our responsibility to tackle it."*
- 4.2.41 In May 2019 the Scottish Government formally declared a climate emergency. In a speech to the Scottish Parliament, the Climate Change Secretary stated:
- "There is a global emergency. The evidence is irrefutable. The science is clear. And people have been clear: they expect action."*
- 4.2.42 The Minister also highlighted the important role of the planning system in achieving climate change objectives, stating:



"...the next National Planning Framework and review of the Scottish Planning Policy will include considerable focus on how the planning system can support our climate change goals."

The Climate Change (Emissions Reduction Targets) (Scotland) Act 2019

- 4.2.43 The Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 ("the 2019 Act") received Royal Assent on 31 October 2019 and came into force in March 2020. The Act responds to the Paris Agreement and the declaration of a 'climate emergency' in Scotland. It amends the Climate Change (Scotland) Act 2009 and commits Scotland to a new target of net zero emissions of all greenhouse gases by 2045, and introduced interim and annual targets for reductions of at least 56% by 2020, 75% by 2030 and 90% by 2040 (% reduction of emissions targets are relative to 1990 baseline). To help ensure delivery of the long-term targets, the framework includes statutory annual targets for every year to net zero.
- 4.2.44 In April 2024, in response to the findings of the Committee on Climate Change ("CCC") Report to the Scottish Parliament (March 2024), the Scottish Government abandoned its target of achieving a 75% reduction in emissions by 2030, stating that the target is unachievable. The Scottish Government did however note its continued commitment to reaching net zero by 2045, a target that remains embedded in statute.
- 4.2.45 The interim and annual targets introduced by the 2019 Act have been superseded by the Climate Change (Emissions Reduction Targets) (Scotland) Act 2024 ("the 2024 Act"). The 2024 Act is covered in detail in the following sections of this chapter (paragraphs 4.2.63 to 4.2.66).

Scottish Government Climate Change Plan: 2026-2040

- 4.2.46 The Scottish Government published a new Climate Change Plan in March 2026, following a consultation that closed in January 2026. The Plan covers the period 2026–2040 and sets out the policies and proposals required to ensure that Scotland's carbon budgets for this period, established under the 2019 Act can be met.
- 4.2.47 The Plan outlines that Scotland has already achieved significant success in renewable energy deployment, with 73.1% of all electricity generated in 2024 coming from renewable sources. Scotland also remained a net exporter of electricity to the rest of the UK, exporting 19.7 terawatt-hour (TWh) to other UK nations in 2024. Building on this success, the Plan confirms that renewable energy capacity is expected to grow, supported by a strong pipeline of future projects that will play a key role in decarbonising the UK power system.
- 4.2.48 The Plan also highlights a wide range of benefits associated with the transition beyond reducing greenhouse gas emissions, including:
- Financial benefits: Direct financial gains and cost savings arising from the implementation of the Plan's policies;
 - Economic opportunities: Growth in green jobs and increased opportunities for Scottish businesses as part of the transition to net zero;
 - Health impacts: Improved public health outcomes due to reduced emissions and associated mitigation measures;
 - Co-benefits: Wider societal benefits across Scotland resulting from decarbonisation.



A Stronger and More Resilient Scotland: Programme for Government 2022-23 (2022)

- 4.2.49 The Programme for Government is published every year at the beginning of September and sets out the actions that the Scottish Government will take in the coming year and beyond, alongside subsequent initiatives and policy programmes,
- 4.2.50 The Scottish Government's 'A stronger and more resilient Scotland' was published in September 2022. This document reaffirms the Scottish Government's commitment to targets set out in prior programmes by confirming that these commitments "*remain in place and our ambition to deliver them is undiminished: the more so since we are clear that much of the answer to the current cost crisis and the poverty it will cause lies in our journey to net zero, investment in a strong economy, and in building a fairer society.*".
- 4.2.51 Page 11 notes that "*Scotland has the potential to become a global green energy powerhouse, for Europe and beyond. Scotland's vast potential for renewable energy generation opens up opportunities for exporting electricity and green hydrogen, and attracting energy intensive industries.*".

Onshore Wind Policy Statement 2022

- 4.2.52 The Scottish Government's 'Onshore Wind Policy Statement 22' (OWPS 22) was published in December 2022 (replacing the previous version from 2017), focusing on the following areas:
- Balancing environmental considerations;
 - Maximising community benefit;
 - Supporting economic growth;
 - Aviation considerations;
 - Technical considerations;
 - Addressing Energy systems and regulation; and
 - Delivering a just transition to net zero.
- 4.2.53 The OWPS 22 has been published with a purpose of restating the importance of onshore wind as a tool to accelerate Scotland's transition towards a net zero society. In the Ministerial Forward to the policy the Russian invasion of Ukraine, and subsequent global energy crisis is cited as an additional reason for the further development of onshore wind in Scotland. The statement emphasises the importance of onshore wind in Scotland as a cheap and reliable source of zero carbon electricity. Within the statement, the Scottish Government commits to an overall ambition of 20GW of total installed onshore wind capacity by 2030 (which remains in place despite the Scottish Government withdrawing, in April 2024, the target of a 75% reduction in greenhouse gas emissions by 2030, compared to 1990 levels), increasing the current installed capacity by 11.3GW. Referring to the projection that Scotland's peak demand for electricity will at least double within the next two decades, chapter 1 of the OWPS 22 details that "*This will require a substantial increase in installed capacity across all renewable technologies*".
- 4.2.54 The statement highlights the relative inexpensiveness to develop, and increasing profitability of onshore wind, showing that the cost of onshore wind has continued to fall over the contract for difference allocation rounds – showing costs of around 45% lower than in 2015.



- 4.2.55 The necessity for taller turbines has been reaffirmed in paragraph 3.4.6 “...*What would previously have been considered ‘taller’ turbines are now more common and must continue to be deployed in appropriate locations...*” whilst in section 3.4.7 it reiterates why these turbines are a necessity “*Taller turbines have a higher installed capacity which results in the need for fewer turbines per site*”.
- 4.2.56 The statement clarifies the Scottish Government’s position on the construction of new wind farms and their effect on the landscape further in section 3.6.2 “*The only areas where wind energy is not supported are National Parks and National Scenic Areas. Outside of these areas, the criteria for assessing proposals have been updated, including stronger weight being afforded to the contribution of the development to the climate emergency, as well as community benefits*” as reflected in NPF4.
- 4.2.57 The OWPS 22 promotes community benefits, and the Scottish Government continues to encourage community benefits from all renewable energy businesses as set out in the Onshore renewable energy - refreshing the good practice principles for community benefits: working paper published in February 2026. However, it should be noted however, that this is a voluntary arrangement that is separate and distinct from the planning and consenting process). Along with community benefits, the statement advocates for an increase in shared ownership of renewables developments. The Scottish Government has set a target of 2GW of community and locally owned energy by 2030 as a minimum and encourages developers to consider shared ownership opportunities in all projects.

Draft Energy Strategy and Just Transition Plan 2023

- 4.2.58 On 10 January 2023, the Scottish Government published the Draft version of its ‘Energy Strategy and Just Transition Plan - delivering a fair and secure zero carbon energy system for Scotland’. This draft plan outlines the key ambitions for Scotland’s energy future, with an even greater focus on renewable energy. It is predicted that these policies would result in a net jobs gain across the energy production sector and will increase renewable energy exports whilst also reducing exposure to future global energy market fluctuations.
- 4.2.59 The draft plan outlines several of the government’s targets to reach a net zero Scotland, with the main milestones and dates outlined as:
- To substantially increase Scotland’s renewable electricity generation capacity from the current level of 13.4 Gigawatts (GW) with an additional 20GW resulting in an overall capacity of at least 33.4GW by 2030;
 - Aims to have 8-11GW of installed offshore, and an additional 12GW of installed onshore wind capacity by 2030;
 - For renewable and low-carbon hydrogen power to provide 5GW (the equivalent of 15% of Scotland’s current energy needs) by 2030, increasing to 25GW by 2045; and
 - To phase out the necessity for new petrol and diesel cars by 2030, and to reduce total car kilometres by 20%.
- 4.2.60 The draft plan also outlines general commitments made by the Government to assist with the transition to net zero, which include the following:
- To establish a national public energy agency – ‘Heat and Energy Efficiency Scotland’;
 - To increase the contributions of solar, hydropower and marine energy within Scotland’s energy mix;



- To accelerate the decarbonisation of domestic industry, transport and heat in buildings;
- To generate surplus electricity – allowing for the export of electricity and renewable hydrogen to support decarbonisation across Europe;
- To create energy security – through the development of Scotland’s resources and additional energy storage;
- To allow for a just transition by maintaining or increasing employment in Scotland’s energy production sector against a decline in North Sea production; and
- To maximise the use of Scottish manufactured components in the energy transition, ensuring high-value technology and innovation.

4.2.61 Page 120 of the draft plan highlights the UK Government’s decision not to award the Scottish Cluster, led by the Acorn Project at St Fergus, track 1 status in their carbon capture, utilisation and storage (CCUS) cluster sequencing process. The draft plan goes on to state that this decision from the UK Government will have a negative effect on Scotland’s ability to meet emissions reduction targets. As a result of this, it is highlighted that Scotland “*will require contingency planning to identify the additional emissions reduction effort that may be needed from other sectors to meet Scotland’s 2030 target*”.

Onshore Wind Sector Deal 2023

4.2.62 On 21 September 2023, the Scottish Government published ‘The Onshore Wind Sector Deal’. The deal sets out the commitments from the Scottish Government and the onshore wind farm industry to deliver 20GW of onshore wind energy by 2030. The Government and the onshore wind farm industry’s commitments within the deal include:

- Support the enhancement of current skills and training provisions through further higher education and training to focus on delivery of the needs of the wind industry;
- Continue to collaborate with local communities, building on good practices to enhance its existing ‘good neighbour’ approach through engagement at all stages of the project’s lifecycle and offering impactful community benefits and practical routes to shared ownership;
- New onshore wind projects will enhance biodiversity and optimise land use and environmental benefits;
- Develop evidence to support a more strategic approach to delivering the investment in our electricity network and to inform a coordinated approach to the transportation of wind turbine components across Scotland’s road network; and
- Deliver cooperative coexistence between onshore wind deployment and safe aviation operations.

The Climate Change (Emissions Reduction Targets) (Scotland) Act 2024

4.2.63 As set out in paragraph 4.2.44 above the Scottish Government abandoned certain emissions targets in April 2024. The 2024 Act brought those changes into law by amending the Climate Change (Scotland) Act 2009 and superseding parts of the 2019 Act. This came into force on 23 November 2024.

4.2.64 This 2024 Act replaces the system of annual and interim emissions reduction targets with a new system of periodic carbon budgets that are focussed on emissions over a five year period.



- 4.2.65 The Scottish carbon budget target is a target for the aggregate emissions reduction over a number of years, not a target for a single year. As a result, the Scottish Government is required to set budgets for five-year periods, not including the final budget, which may be shorter. This is because the final budget will run until the net-zero emissions target year, which might be less than five years after the previous budget period.
- 4.2.66 The 2024 Act does not change the existing statutory target of net zero emissions by 2045. The emissions reductions targets set out are significant and the 2009 Act states the Scottish Ministers have a duty to ensure the targets are met. All Scottish public authorities also have a duty to exercise their functions in a way best calculated to contribute to the delivery of the targets.

Scottish Government Green Industrial Strategy (2024)

- 4.2.67 The Scottish Government Green Industrial Strategy, published in September 2024, has the overarching purpose of ensuring that Scotland secures the maximum possible economic benefit from the global transition to net zero. The Strategy identifies five key opportunity areas in which Scotland is particularly well placed to develop internationally competitive economic clusters.
- 4.2.68 The first opportunity area, 'Maximising Scotland's Wind Economy', seeks to build on Scotland's natural resources, established onshore and offshore wind sectors, and position Scotland as a leader in material circularity of wind turbines and components. The Strategy sets out a number of actions for this opportunity area, several of which align with the Proposed Development, including:
- Supporting investment to improve essential infrastructure, expand supply chains, and secure manufacturing opportunities;
 - Developing and maintaining a pipeline of investment propositions, supported by clear information on the timing and nature of renewable energy opportunities; and
 - Working with the UK Government to maximise the benefits to Scotland from key UK wide funding schemes.
- 4.2.69 Opportunity Areas 3 and 5 are also relevant to the Proposed Development:
- Area 3: Supporting green economy professional and financial services with global reach – building on Scotland's strengths in high value, tradable service sectors and considering how the Scottish Government can support future innovation and growth.
 - Area 5: Establishing Scotland as a competitive centre for the clean Energy Intensive Industries of the future – supporting the electrification of existing energy intensive industries where appropriate, and positioning Scotland as an attractive location for both existing and new clean industries that will benefit from Scotland's growing renewable electricity capacity.

4.3 Planning Policy

Scottish Government Planning Policy

- 4.3.1 National Planning Framework 4 (NPF4) was adopted by the Scottish Government on 13 February 2023. NPF4 has replaced National Planning Framework 3 (NPF3) and Scottish Planning Policy 2014 (SPP), which no longer represent Scottish Ministers' planning policy and should not be relied upon when determining planning applications under the Town and Country Planning (Scotland) Act 1997.



- 4.3.2 NPF4 now forms part of the statutory Development Plan, alongside adopted local development plans. In the case of the Proposed Development, the relevant local plan is the Stirling Local Development Plan 2 (2018).
- 4.3.3 A Chief Planner's Letter dated 8 February 2023, entitled "*Transitional Arrangements for National Planning Framework 4*", provides guidance to support consistency in decision-making during the transition period ahead of the adoption of new-style Local Development Plans prepared under NPF4.
- 4.3.4 NPF4 and the relevant Local Development Plan are to be read together as the Development Plan for the purposes of Section 25 of the 1997 Act. Where there is any incompatibility between the two, NPF4 is the more up-to-date document and carries significant weight in the decision-making process, reflecting its role in setting out Scotland's national spatial strategy, including national priorities for renewable energy, climate change mitigation, and sustainable development.

National Planning Framework 4 (NPF4)

- 4.3.5 NPF4 sets out the overarching spatial strategy for Scotland up to 2045 and is informed by two prior rounds of public consultation. These consultations identified the need for a rebalancing of the planning system to ensure that climate change mitigation and adaptation are guiding principles for all future plans and decisions. Accordingly, the urgency of addressing the climate emergency, and the fundamental role of the planning system in delivering the necessary transition, is a central theme of NPF4, which states that: "*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*".
- 4.3.6 Within the spatial strategy, NPF4 identifies the Central Scotland area (which includes the Site), as a key focus for action. NPF4 recognises that meeting Scotland's climate change commitments will require significant change in this region and highlights the need to decarbonise energy supply, make efficient use of land, and increase renewable energy generation, supported by appropriate electricity infrastructure.
- 4.3.7 NPF4 further states that a coherent spatial strategy, focused on climate change, will support the delivery of a greener and more resilient future for Central Scotland, and identifies renewable electricity generation and associated infrastructure as an important component of achieving this outcome. Development which contributes to the delivery of renewable energy capacity is therefore consistent with the spatial priorities established by NPF4 for this area.
- 4.3.8 Considering Scotland as a whole, NPF4 recognises that a large and rapid increase in electricity generation from renewable sources will be essential in order to meet statutory net zero emissions targets. The Proposed Development at Cairnoch Hill would contribute to this national objective through the delivery of new onshore wind capacity, supporting both the spatial strategy and Scotland's wider climate ambitions.
- 4.3.9 In policy terms, the Proposed Development is assessed against the relevant policies of NPF4, being Policy 1 (Tackling the Climate and Nature Crises), Policy 3 (Biodiversity), Policy 5 (Soils), Policy 7 (Historic Assets and Places), and Policy 11 (Energy). These policies are considered in more detail in the sections that follow.

Policy 1: Tackling the climate and nature crisis

- 4.3.10 A key policy is Policy 1: Tackling the climate and nature crises. This policy requires that "*significant weight will be given to the global climate and nature crises*" when considering all development proposals. The addition of this policy is reflective of the increased prominence and weight which the Scottish Government now expect to be given to the climate emergency in all planning decisions. It goes on to state that Local



Development Plans must: “address the global climate emergency and nature crisis by ensuring the spatial strategy will reduce emissions and adapt to current and future risks of climate change by promoting nature recovery and restoration in the area.”

Policy 3: Biodiversity

- 4.3.11 Policy 3: Biodiversity is another policy which will impact the decision-making process for the Proposed Development. This policy intends to: “*protect biodiversity, reverse biodiversity loss, deliver positive effects from development and strengthen nature networks*” and states that Local Development Plans should “*protect, conserve, restore and enhance biodiversity in line with the mitigation hierarchy. They should also promote nature recovery and nature restoration across the development plan area, including by: ...restoring degraded habitats or creating new habitats...*”
- 4.3.12 For applications that require an EIA such as the Proposed Development, policy 3(b) states that applications “*will only be supported where it can be demonstrated that the proposal will conserve, restore and enhance biodiversity, including nature networks so they are in a demonstrably better state than without intervention.*” This will include future management. To inform this, best practice assessment methods should be used. Proposals within these categories will demonstrate how they have met all of the following criteria:
- i. the proposal is based on an understanding of the existing characteristics of the site and its local, regional and national ecological context prior to development, including the presence of any irreplaceable habitats;
 - ii. wherever feasible, nature-based solutions have been integrated and made best use of;
 - iii. an assessment of potential negative effects which should be fully mitigated in line with the mitigation hierarchy prior to identifying enhancements;
 - iv. significant biodiversity enhancements are provided, in addition to any proposed mitigation. This should include nature networks, linking to and strengthening habitat connectivity within and beyond the development, secured within a reasonable timescale and with reasonable certainty. Management arrangements for their long term retention and monitoring should be included, wherever appropriate; and
 - v. local community benefits of the biodiversity and/or nature networks have been considered”.
- 4.3.13 Policy 3(d) also requires that “*any potential adverse impacts, including cumulative impacts, of development proposals on biodiversity, nature networks and the natural environment will be minimised through careful planning and design. This will take into account the need to reverse biodiversity loss, safeguard the ecosystem services that the natural environment provides, and build resilience by enhancing nature networks and maximising the potential for restoration.*”.

Policy 5: Soils

- 4.3.14 Policy 5: Soils intends to “*protect carbon-rich soils, restore peatlands and minimise disturbance to soils from development.*”. Policy 5 (a) goes on to state that:
- “*Development proposals will only be supported if they are designed and constructed:*
- i. In accordance with the mitigation hierarchy by first avoiding and then minimising the amount of disturbance to soils on undeveloped land; and*



ii. In a manner that protects soil from damage including from compaction and erosion, and that minimises soil sealing”.

Policy 7: Historic Assets and Places

4.3.15 Policy 7: Historic Assets and Places intends to *“protect and enhance historic environment assets and places, and to enable positive change as a catalyst for the regeneration of places.”*. Policy 7(h) applies to the Proposed Development due to the proximity of nearby scheduled monuments, and states that

“Development proposals affecting scheduled monuments will only be supported where:

- i. direct impacts on the scheduled monument are avoided;*
- ii. significant adverse impacts on the integrity of the setting of a scheduled monument are avoided; or*
- iii. exceptional circumstances have been demonstrated to justify the impact on a scheduled monument and its setting and impacts on the monument or its setting have been minimised”.*

Policy 11: Energy

4.3.16 Regarding onshore wind, Policy 11: Energy, intends to *“encourage, promote and facilitate all forms of renewable energy development onshore and offshore”*. Policy outcomes are identified as: *“expansion of renewable, low carbon and zero emission technologies”*. The policy declares that development proposals for wind farms outwith National Parks and National Scenic Areas should be supported, whilst also considering the impacts that have been identified. It is recognised that *“significant landscape and visual impacts,...are to be expected for 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”*. In terms of the impacts, the policy goes on to state that: *“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”*.

4.3.17 Policy 11: Energy is as follows:

“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;*
- iv. 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 Parks 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 such impacts are to be expected for 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.”.

Other Relevant NPF4 Policies

4.3.18 In addition to the above NPF4 policies, the following are also considered applicable to the Proposed Development: 2) Climate mitigation and adaptation, 4) Natural Places, 12) Zero Waste, 13) Sustainable transport, 14) Design, quality and place, 18) Infrastructure First, 19) Heating and cooling, 20) Blue and green infrastructure, 21) Play, recreation and sport, 22) Flood risk and water management, 23) Health and safety, 25) Community wealth building, 26) Business and industry, 29) Rural development, 30) Tourism, and 33) Minerals.

Development Policy

4.3.19 The Proposed Development falls within the administrative boundary of Stirling Council. As such, the statutory Development Plan relevant to its determination comprises NPF4 and the Stirling Local Development Plan 2 (LDP2), which was adopted in 2018. Stirling LDP2 sets out the spatial strategy and land use policies for the area and provides the local policy framework against which planning applications are assessed. While NPF4 takes precedence where there is any conflict, Stirling LDP2 remains a key material consideration in the determination of the Proposed Development.

Stirling Local Development Plan

4.3.20 The Proposed Development falls within the administrative boundary of Stirling Council, and the relevant local development plan is the Stirling LDP, adopted in 2018. LDP forms part of the statutory Development Plan alongside NPF4 and sets out the spatial strategy and land-use policies for the Stirling Council area. As LDP forms part of the statutory Development Plan decision makers must have regard to this in the determination of planning applications. However, as NPF4 has been adopted more recently than LDP in the event of policy incompatibility NPF4 takes precedence.

4.3.21 The primary local development plan policy relevant to the Proposed Development is Primary Policy 12: Renewable Energy. The LDP supports renewable energy proposals, including onshore wind, where they are appropriately sited and designed and where potential environmental effects can be satisfactorily addressed through mitigation.

4.3.22 In particular, Primary Policy 12 of the LDP requires proposals to demonstrate that they:

- Comply with spatial framework mapping; and
- Are of a scale, layout and nature such that adverse environmental impacts, including cumulative impacts, are avoided or minimised to the satisfaction of the planning authority.;

4.3.23 In addition to the above, the following Stirling LDP primary policies are considered relevant to the assessment of the Proposed Development:

- Primary Policy 1 – Placemaking;
- Primary Policy 4 – Greenhouse Gas Reduction;
- Primary Policy 5 – Flood Risk Management;
- Primary Policy 7 – Historic Environment;
- Primary Policy 8 – Conservation and Enhancement Biodiversity;
- Primary Policy 9 – Managing Landscape Change;



- Primary Policy 10 – Forestry Woodlands and Trees;
- Primary Policy 13: The Water Environment; and
- Primary Policy 14: Soil Conservation and Agricultural Land.

4.3.24 These policies collectively address matters including design quality, landscape and visual effects, ecology and biodiversity, the water environment, cultural heritage, access and transport, and climate change mitigation.

4.3.25 Stirling Council has also produced a range of supplementary guidance and evidence documents that support the application of LDP policies, including Landscape Character Assessments and guidance on renewable energy development and placemaking. These documents provide additional context for assessing the suitability of locations for wind energy development and the likely sensitivity of the receiving environment.

4.3.26 The relevant LDP policies and associated guidance are addressed in detail within the Planning Statement that accompanies the application, as well as, where appropriate, within the relevant technical chapters of this EIA Report.

4.3.27 **Table 4-1** identifies the key Stirling LDP policies that are considered relevant to the assessment of the Proposed Development. These policies and any associated supplementary guidance are addressed in detail within the Planning Statement accompanying the application and, where appropriate, within the relevant technical chapters of this EIA Report.

Table 4-1 Relevant Stirling LDP Policies and Supplementary Guidance

LDP2 Policies	Associated Supplementary Guidance / Evidence Base
Primary Policy 1 – Placemaking	
Primary Policy 4 – Greenhouse Gas Reduction	
Primary Policy 5 – Flood Risk Management	Flood Risk Management and the Water Environment (May 2020)
Primary Policy 7 – Historic Environment	
Primary Policy 8 – Conservation and Enhancement Biodiversity	
Primary Policy 9 – Managing Landscape Change	
Primary Policy 10 – Forestry Woodlands and Trees	Forestry and Woodland Strategy (May 2019)
Primary Policy 12: Renewable Energy	Wind Energy Developments (February 2019)
Primary Policy 13: The Water Environment	Flood Risk Management and the Water Environment (May 2020)
Primary Policy 14: Soil Conservation and Agricultural Land	

Emerging Stirling Local Development Plan 3 (LDP3)

4.3.28 Stirling Council is currently preparing its third Local Development Plan (LDP3) following the Scottish Ministers' approval of the council's Evidence Report. This will be Stirling Council's first local development plan prepared since the adoption of NPF4. While the emerging plan provides an indication of the future planning direction for the Stirling Council area, it is not yet adopted and therefore does not form part of the statutory



Development Plan but may still be taken into account by a decision-maker as a material consideration.

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4.5 Abbreviations List

Abbreviation	Meaning
AR6	Sixth Assessment Report (IPCC)
CCC	Committee on Climate Change
CCUS	Carbon Capture, Utilisation and Storage
COP	Conference of the Parties
DESNZ	Department for Energy Security and Net Zero
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EU	European Union
GW	Gigawatt
HES	Historic Environment Scotland
IPCC	Intergovernmental Panel on Climate Change
LDP	Local Development Plan
LDP2	Stirling Local Development Plan 2
LDP3	Stirling Local Development Plan 3
MW	Megawatt
NDC	Nationally Determined Contribution
NPF4	National Planning Framework 4
NSA	National Scenic Area
OWPS 22	Onshore Wind Policy Statement 22
SES	Scottish Energy Strategy
TWh	Terawatt-hour
UN	United Nations



Abbreviation	Meaning
UNFCCC	United Nations Framework Convention on Climate Change
UNEP	United Nations Environment Programme



Making Sustainability Happen



Chapter 5: Environmental Impact Assessment

Environmental Impact Assessment Report

Cairnoch Hill Wind Farm

3 August 2026



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5.0 Introduction

5.1 Introduction

- 5.1.1 This chapter discusses the requirement for an Environmental Impact Assessment (EIA) and sets out the assessment approach adopted in this EIA Report. The EIA Report has been prepared in accordance with the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 (“the EIA Regulations”), in support of a planning application to Stirling Council for the proposed Cairnoch Hill Wind Farm (the “Proposed Development”).

5.2 EIA Regulations

- 5.2.1 Where a development falls within one of the descriptions set out in Schedule 2 of the EIA Regulations and is considered likely to have significant effects on the environment, an EIA is required to accompany the application for consent. The Proposed Development falls within Schedule 2, paragraph 2 (3)(j) as an installation for the harnessing of wind power for energy production, involving the installation of more than two wind turbines.
- 5.2.2 It was acknowledged at an early stage that, given the nature, scale, location and characteristics of the Proposed Development, an EIA would be required. A Scoping Request was submitted to Stirling Council under Regulation 17 of the EIA Regulations on 11 September 2024, and this EIA Report has been prepared having regard to the Scoping Opinion issued by the Council on 13 November 2024.
- 5.2.3 Establishing which aspects of the environment and associated issues are relevant to a particular project is undertaken through the EIA scoping process. The results of the EIA are presented in this EIA Report. Schedule 4, paragraph 5 of the EIA Regulations, requires a description of the likely significant effects of the Proposed Development to be included. It is therefore necessary for the scope of the EIA to be clearly defined to ensure that all likely significant effects are appropriately identified, assessed and reported.
- 5.2.4 Scoping is the process of identifying those aspects of the environment and associated issues which may be significantly affected by the Proposed Development and which therefore require detailed assessment as part of the EIA. This recognises that there may be some environmental topics for which no significant effects are anticipated and for which further assessment is not required. Details of the scoping process undertaken for the Proposed Development are provided in **Chapter 6: Scoping and Consultation**.
- 5.2.5 Following the establishment of the EIA scope, individual environmental topics have been subject to survey, investigation and assessment, with topic-specific chapters prepared for inclusion within this EIA Report. The assessment methodologies adopted are based on recognised good practice guidance and discipline-specific standards appropriate to the nature of the Proposed Development.
- 5.2.6 The EIA Regulations require that the planning authority take the environmental information provided in the EIA Report into account before determining an application for EIA development.
- 5.2.7 This EIA Report has been prepared for consideration by Stirling Council in the determination of the planning application for the Proposed Development.



5.3 Requirements of the EIA Directive and Regulations

- 5.3.1 The approach to this EIA has been undertaken in accordance with the requirements of the EIA Regulations.
- 5.3.2 Regulation 4 of the EIA Regulations defines the EIA process and identifies the environmental factors and their interactions that must be considered as part of the assessment. Regulation 5 sets out the minimum requirements for an EIA Report and confirms that, where a Scoping Opinion has been issued by the planning authority, the EIA must be prepared having regard to the matters raised within that Scoping Opinion.
- 5.3.3 Schedule 4 of the EIA Regulations specifies the information that must be included within an EIA Report. This information is summarised in **Table 5-1**, which identifies the required Schedule 4 information and cross-references where the corresponding details are provided within this EIA Report.

Table 5-1: EIA Report Required Information

Required Information	Relevant Section of the EIA Report
1. Description of the development, including in particular: (a) a description of the location of the development; (b) a description of the physical characteristics of the whole development, including, where relevant, requisite demolition works, and the land-use requirements during the construction and operational phases; (c) a description of the main characteristics of the operational phase of the development (in particular any production process), for instance, energy demand and energy used, nature and quantity of the materials and natural resources (including water, land, soil and biodiversity) used; (d) an estimate, by type and quantity, of expected residues and emissions (such as water, air, soil and subsoil pollution, noise, vibration, light, heat, [radiation]) and quantities and types of waste produced during the construction and operation phases.	A description of the location of the Proposed Development is presented in Chapter 2 . A description of the Proposed Development and its characteristics is presented in Chapter 3 . The predicted individual environmental effects of the Proposed Development are reported in Chapters 7 to 15 .
2. A description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.	The alternatives considered are covered in Chapter 2 .
3. A description of the relevant aspects of the current state of the environment (the “ <i>baseline scenario</i> ”) and an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of relevant information and scientific knowledge.	Provided in Chapters 7 to 15 .
4. A description of the factors specified in regulation 4(3) likely to be significantly affected by the development: population, human health, biodiversity (for example fauna and flora), land	Effects on population are discussed in relation to visual impacts, traffic, noise and air quality. Material assets are addressed through the effects identified for land use, soil, geology and



Required Information	Relevant Section of the EIA Report
(for example land take), soil (for example organic matter, erosion, compaction, sealing), water (for example hydromorphological changes, quantity and quality), air, climate (for example greenhouse gas emissions, impacts relevant to adaptation), material assets, cultural heritage, including architectural and archaeological aspects, and landscape.	waste, hydrology and cultural heritage. Provided in Chapters 7, 10, 11, 12, 13 and 15 .
5. A description of the likely significant effects of the development on the environment resulting from, inter alia: (a) the construction and existence of the development, including, where relevant, demolition works; (b) the use of natural resources, in particular land, soil, water and biodiversity, considering as far as possible the sustainable availability of these resources; (c) the emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances, and the disposal and recovery of waste; (d) the risks to human health, cultural heritage or the environment (for example due to accidents or disasters); (e) the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources; (f) the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change; (g) the technologies and the substances used. The description of the likely significant effects on the factors specified in regulation 4(3) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the development. This description should take into account the environmental protection objectives established at Union level (as they had effect immediately before 31 December 2020) or United Kingdom level which are relevant to the project including in particular those established under the law of any part of the United Kingdom that implemented Council Directive 92/43/EEC and Directive 2009/147/EC.	Assumptions and limitations of the EIA process are reported as required in the relevant technical chapters. The predicted significant effects of the Proposed Development are reported in each of the technical chapters as residual effects after relevant mitigation measures are described in the EIA Report (Chapters 7 to 15). The methods used to predict significant effects are explained in this chapter and each individual chapter as relevant. Effects have been predicted in relation to the Proposed Development's construction and permanent use of the land. The operation and nature of these effects and their duration are reported.
6. A description of the forecasting methods or evidence, used to identify and assess the significant effects on the environment, including details of difficulties (for example technical deficiencies or lack of knowledge) encountered compiling the required information and the main uncertainties involved.	Methodologies, assumptions and limitations in the EIA process are reported as required in the relevant technical chapters.
7. A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any	EIA Report (Chapters 7 to 15). The overall approach to mitigation is discussed in these chapters. Specific mitigation measures



Required Information	Relevant Section of the EIA Report
proposed monitoring arrangements (for example the preparation of a post project analysis). That description should explain the extent to which significant adverse effects on the environment are avoided, prevented, reduced or offset, and should cover both the construction and operational phases.	are reported in each relevant technical chapter and are summarised in Chapter 16 .
8. A description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project concerned.	Chapter 15 considers the risk of major accidents and/or disasters relevant to the Proposed Development.
9. A non-technical summary of the information provided under paragraphs 1 to 8.	A Non-Technical Summary (NTS) is presented as Volume 1 of this EIA Report.
10. A reference list detailing the sources used for the descriptions and assessments included in the EIA report.	Chapters 1 to 15 each have a reference list detailing relevant sources used.

5.4 EIA and the Design Process

- 5.4.1 The EIA was conducted as an iterative process, rather than a one-off, post design environmental appraisal. This has allowed the findings of the EIA to be fed into the design process, to avoid, reduce and where possible, mitigate environmental effects. Where potentially adverse environmental effects were identified through preliminary investigations as part of feasibility work, or later in the detailed EIA, consideration was given as to how the scheme design could be modified to design out adverse environmental effects, or where this was not possible, to identify appropriate mitigation.
- 5.4.2 This iterative design process is explained further in **Chapter 2: Site Description and Design Evolution** and the **Design and Access Statement**. Consultation, from key consultees and the public, that also fed into the design process is outlined in **Chapter 6: Scoping and Consultation**.

5.5 EIA Project Team and Competency

- 5.5.1 The EIA has been coordinated by SLR Consulting, who led the overall assessment process and authored a number of the technical chapters within this EIA Report. Specialist input has been provided by a range of suitably qualified consultants where required, covering disciplines including noise (TNEI), ornithology (APEM), forestry (DGA Forestry), socio-economics (BIGGAR Economics), aviation (Wind Farm Aviation Safeguarding Ltd), and planning (David Bell Planning).
- 5.5.2 A summary of the core EIA team, including their qualifications, experience, and areas of responsibility, is provided in **Table 1-1** of **Chapter 1: Introduction** of this EIA Report.

5.6 Determining the Scope of the EIA Report

- 5.6.1 The EIA Report provides an objective assessment of the Proposed Development, its likely significant environmental effects, and the measures proposed to avoid, reduce, and, where possible, mitigate any identified adverse environmental effects.
- 5.6.2 The scope of the EIA Report has been established through a combination of informal consultation with stakeholders and a formal EIA scoping process. A Scoping Request was submitted to Stirling Council in September 2024, and a Scoping Opinion was



subsequently issued in November 2024. The matters raised within that Scoping Opinion have informed both the scope and content of this EIA Report.

- 5.6.3 Details of the consultation undertaken as part of the EIA process are provided in **Chapter 6: Scoping and Consultation** and **Technical Appendix 6.1: Scoping Response Table**. The responses received during the scoping process have been considered and addressed where relevant within this EIA Report and are cross-referenced within the individual technical chapters as appropriate.

5.7 Approach and Methods

General Approach to the EIA

- 5.7.1 The assessments undertaken as part of the EIA are based on the location of the Proposed Development (“the Site”) and defined study areas. The Site refers to the area contained within the application boundary shown on **Figure 1.2**. Study areas vary between environmental topics and are defined within the relevant technical chapters of this EIA Report.
- 5.7.2 Assessments have been undertaken using a ‘worst-case’ approach. This approach assumes that the Proposed Development would result in the maximum reasonably foreseeable effect on the receiving environment across the range of potential effects identified.
- 5.7.3 The EIA has been undertaken based on fixed wind turbine locations and associated infrastructure, subject to micro-siting, and a defined wind turbine design envelope for the Proposed Development, illustrated on **Figure 3.1**.
- 5.7.4 The wind turbine tip height, hub height, blade length, and other infrastructure parameters assessed within this EIA Report are defined using the Rochdale Envelope¹ principle and represent the maximum design parameters of the Proposed Development. The assessment assumes a micro-siting allowance of 50m for all proposed infrastructure within the application boundary.
- 5.7.5 Each technical chapter considers the nature, magnitude, and significance of environmental effects arising from the Proposed Development. The Proposed Development is subject to detailed environmental assessment including establishment of mitigation proposals where appropriate. A statement is then given in each chapter about the environmental effects subject to detailed assessment.
- 5.7.6 Schedule 4, paragraph 5, of the EIA Regulations requires a description of the likely significant effects on the environment, to cover *“the direct effects and any indirect, secondary, cumulative, transboundary, short term, medium-term and long-term, permanent and temporary, positive and negative effects of the development”*.
- 5.7.7 **Table 5-2** below summarises the interpretation applied with regards to effects.

¹ The ‘Rochdale Envelope’ principle is employed where the nature of the proposed development means that some details of the whole project have not been confirmed (for instance the precise dimensions of structures, due to unknown market conditions at time of project conception and application) so that when the application is submitted flexibility is sought to address that future uncertainty.



Table 5-2: Interpretation Applied with Regards to Effects

Time Period Effects	Detail	Reversible / Irreversible Effects
Short term effect	An effect which extends over a short period of time only and are typically those associated with the construction or decommissioning periods or other limited periods. This is a temporary effect.	Reversible
Medium term effect	An effect which extends over a period of time which is longer than that of a short term effect but which persists for less than the life of the Proposed Development. This is a temporary effect.	Reversible
Long term effect	An effect which persists to the full lifetime of the Proposed Development. This is a temporary effect.	Reversible
Permanent effect	An effect which persists beyond the lifetime of the Proposed Development. This is a permanent effect.	Irreversible

5.7.8 Assessment criteria have been used to evaluate environmental effects. Significance is generally determined through a combination of the sensitivity of a receptor to an effect and the magnitude of the change. This process is outlined below:

- Identification of environmental baseline conditions at the Site and its environs, including sensitivity of receptors which may be affected by changes in the baseline conditions;
- Consideration of the magnitude of potential changes to the environmental baseline;
- Assessment of the significance of effect taking into account sensitivity of receptors and magnitude of change;
- Identification of appropriate mitigation measures; and
- Assessment of significance of residual effects taking account of any mitigation measures.

5.7.9 Where significant environmental impacts are predicted in the EIA process, then the EIA Report provides measures which would be employed to eliminate or ameliorate the impact to acceptable levels. Mitigation measures can be in the form of changes to operational practice, or changes/additions to the design.

5.7.10 The above approach does not, however, apply to all disciplines addressed in the EIA Report, and alternative approaches were therefore developed as appropriate. These are described and justified in the relevant EIA Report chapter.

Baseline Conditions

5.7.11 A fundamental element of the EIA process is the identification and description of the baseline environmental conditions at the Site. These baseline conditions provide the benchmark against which predicted changes arising from the Proposed Development are assessed in order to determine the magnitude of any impact. The baseline conditions have been established using a combination of desktop studies, field surveys, analytical and predictive models, and data obtained from third-party sources.



- 5.7.12 The assessment of each environmental parameter was undertaken in comparison to baseline conditions. The baseline conditions section in each chapter describes the existing environmental conditions at the Site (and in the wider area as pertinent to the particular environmental parameter).
- 5.7.13 The sensitivity of the baseline conditions has been defined according to the relative sensitivity of existing environmental features on, or in the vicinity of, the Site, or by the sensitivity of receptors which would potentially be affected by the Proposed Development. Criteria for the determination of sensitivity or importance have been established based on prescribed guidance, legislation, statutory designation and/or professional judgement. The criteria for each environmental parameter are outlined in the EIA Report according to the technical subject area.
- 5.7.14 Relevant wind farms (and other developments) which are under construction, operational or consented are considered to be part of the baseline for the purposes of this EIA Report, unless specifically stated otherwise within relevant topic chapters.
- 5.7.15 The EIA Report considers the present baseline environment but also considers how the baseline environment may change during the operational period of the Proposed Development (for example in relation to climate change).

Consultation

- 5.7.16 Consultation has formed an integral part of the EIA process and both the EIA team and the applicant have contacted a number of interested parties to determine their views on the Proposed Development, collected baseline information and refine survey methodologies
- 5.7.17 **Chapter 6: Scoping and Consultation** provides a summary of the formal EIA scoping consultation undertaken, with **Technical Appendix 6.1** presenting a detailed table of consultation responses and how they have been addressed. In addition, each technical chapter of this EIA Report summarises the topic-specific consultation undertaken with relevant consultees.
- 5.7.18 In relation to community engagement, three rounds of Pre-Application Consultation (PAC) were undertaken as part of the EIA process.
- The first round of public exhibitions was held in November 2024, introducing the Proposed Development and seeking early feedback on the initial Site layout and key considerations;
 - The second round of exhibitions was held in March / April 2026, presenting an updated scheme design and responding to feedback received during the first round; and
 - A third round of public consultation was undertaken in June 2026, providing further information on the refined design, emerging assessment findings, and next steps in the design and assessment process.
- 5.7.19 Exhibition materials included layout plans, information boards outlining key environmental considerations, and visual material illustrating the Proposed Development. Details of each consultation event, together with a summary of feedback received and how this has informed the scheme, are provided in the **Pre-Application Consultation (PAC) Report** submitted alongside the planning application.
- 5.7.20 In addition to the public exhibitions, ongoing engagement with local community representatives and stakeholders took place throughout 2024, 2025 and 2026, including correspondence and meetings to discuss the progress of the Proposed Development and potential opportunities for community benefits and shared ownership.



Sensitivity of Receptor

5.7.21 Criteria for the determination of sensitivity (e.g. 'high', 'medium', or 'low') or of importance (e.g. 'international', 'national', 'regional' or 'authority area') have been established based on prescribed guidance, legislation, statutory designation and/or professional judgement. The criteria for each environmental parameter are provided in the relevant chapter of the EIA Report.

Magnitude of Change

5.7.22 The magnitude of change on environmental baseline conditions is identified through detailed consideration of the Proposed Development, taking due cognisance of any legislative or policy standards or guidance, and/or the following factors:

- The degree to which the environment would be changed, e.g. whether the quality is enhanced or impaired;
- The scale or degree of change from the baseline situation;
- Whether the change is temporary or permanent, indirect or direct, short term, medium term or long term; and
- Changes resulting from any in-combination or cumulative effects.

5.7.23 The magnitude of change for a receptor that would be affected by a Proposed Development would be identified on a scale from very low to very high. As with receptor sensitivity or value, a rationale is provided in each topic chapter (**Chapter 7 to Chapter 15**) that explains how the categories of environmental change are defined. For certain topics, the magnitude of change would be related to guidance on what levels of change are acceptable (e.g. noise) and be based on numerical parameters. For other changes, it will be a matter of professional judgement to determine the magnitude of change, using descriptive terms.

Assessment of Effects

5.7.24 The assessment of potential effects, using a range of appropriate methodologies, takes into account the construction and operation of the Proposed Development in relation to the Site and environs. Further detail on decommissioning of the Proposed Development is provided in **Chapter 3: Description of the Development** and **Chapter 6: Scoping and Consultation**, however; an assessment of the potential effects of the decommissioning of the Proposed Development have been scoped out of the EIA as impacts during decommissioning are expected to be similar to, or no worse than those predicted for construction. Also noted at this stage, future baseline conditions cannot be predicted accurately and both the proposals for refurbishment / decommissioning and the future regulatory context are unknown. Methodologies for predicting the nature and magnitude of any potential environmental impacts vary according to the technical subject area. Numerical or quantitative methods of assessment are used to predict values which can be compared against published thresholds and indicative criteria contained in relevant guidance and standards.

5.7.25 Not all technical subject areas are capable of being assessed numerically or quantitatively, and thus qualitative assessments are used in certain cases. Such assessments rely on previous experience of similar projects, environments and professional judgement.

Assessment of Cumulative Effects

5.7.26 In accordance with the EIA Regulations, the assessment has considered 'cumulative effects'. By definition, these are effects which result from incremental changes caused



by past, present or reasonably foreseeable projects of a similar nature to the Proposed Development, together with the Proposed Development. Likely cumulative effects have been defined as the likely effects that the Proposed Development may have in combination with other energy park developments in the local area which are at application stage, consented, under construction or operational (i.e. the incremental effects resulting from the Proposed Development if all other developments are assumed to be constructed / operated). The extent to which the potential combined effects through that co-existence is considered, is described as appropriate throughout **Chapters 7 to 15** of this EIA Report.

5.7.27 The study area for considering cumulative effects varies per technical discipline and each EIA Report chapter refers to the cumulative sites considered as appropriate. In general, most specialisms have considered cumulative effects from, operational, under construction, consented, or at application stage wind farm sites, within approximately 10km from the Proposed Development, which includes the following schemes:

- Craignannet Wind Farm (one wind turbine), located approximately 190m east of the Proposed Development. Operational;
- Earlsburn Wind Farm (15 wind turbines), located approximately 520m north of the Proposed Development. Operational;
- Craigengelt Wind Farm (8 wind turbines), located approximately 450m north east of the Proposed Development. Operational;
- Earlsburn North Wind Farm (9 wind turbines), located approximately 2.5km north of the Proposed Development. Operational;
- Shelloch Wind Farm (five wind turbines), located approximately 1.6km north west of the Proposed Development. Consented;
- Earlsburn Extension Wind Farm (seven wind turbines), located approximately 2.7km north of the Proposed Development. Consented; and
- Drummarnock Wind Farm (four wind turbines), located approximately 1km north east of the Proposed Development. Planning Application Submitted.

5.7.28 The detailed study area for considering cumulative effects on landscape and visual amenity is up to approximately 20km from the proposed wind turbines. Operational, under construction, consented and at application stage wind farm site, between 10km and 20km from the Proposed Development are as detailed in **Table 5-3**.

Table 5-3: Cumulative Sites

Name / Status	Distance to Proposed Development (km)	Number of Turbines	Maximum blade tip height (m)
Operational / Under Construction			
Durieshill	10.4	1	51
Tod Hill	13.0	4	125
Rosehill Farm	15.4	3	100
Bellstane Farm	15.5	1	86.5
Easter Glentore	17.8	1	102
Greengairs East	18.1	8	149.9
Greendykeside	18.2	2	100
Braidenhill Farm	18.7	1	74



Name / Status	Distance to Proposed Development (km)	Number of Turbines	Maximum blade tip height (m)
Green Craig	19.1	1	99.5
Consented			
Bartlett Factory	18.1	1	90

5.7.29 Cumulative wind farm sites that are at Scoping stage (i.e. do not yet have a full planning application submitted) have been excluded from the cumulative assessment due to insufficient certainty regarding whether these schemes will progress to application, and uncertainty around their final scale, layout, or design.

5.7.30 Cumulative wind developments within the vicinity of the Site are identified in **Figure 7.12**, which includes all known operational sites within 20km, as well as sites that are under construction, consented, or at application stage. The cut-off date for inclusion in the cumulative assessment has been set as 21 April 2026.

Mitigation

5.7.31 Mitigation is considered an integral part of the overall design strategy for the proposed development, including 'embedded' mitigation (e.g. altering and refining the proposed development to reduce landscape and visual impact, reduce the number of watercourse crossings or avoid sensitive species and habitats) rather than relying solely on enhancement measures to prevent or reduce environmental effects. Identifying mitigation measures is also a requirement of the EIA Regulations. The Applicant has adopted an iterative approach, whereby mitigation is assessed and considered at all stages of the project, and the final design of the proposed development has evolved over the project lifetime, being systematically optimised during the EIA process in response to increasing knowledge of the Site and potential environmental effects.

5.7.32 Some of the mitigation measures described within **Chapters 7 to 15** of this EIA Report do not relate only to likely significant adverse effects, but have been included as good practice to reduce the level of adverse effects, or enhance the level of beneficial effects, of the Proposed Development. Where relevant, these mitigation measures are described in the EIA Report chapters and have been taken into account in the assessment of effects. **Chapter 16: Schedule of Commitments** provides a summary of the mitigation measures proposed throughout the EIA Report.

5.7.33 Where significant environmental effects are predicted in the EIA process, this EIA Report provides measures which would be employed to eliminate or ameliorate the effect. Mitigation measures are envisaged through the consideration of alternatives, changes / additions to the design of the proposed development, or project management or operation to avoid, prevent, reduce or, where possible, offset any adverse significant effects.

5.7.34 In some cases, environmental mitigation through compensation may be appropriate to provide replacement features or assets (e.g. habitat to replace that which has been disturbed or lost due to the construction of the proposed development). However, compensation may not initially be effective at remedying effects, as it may take time to mature sufficiently to enable the effect of the disturbance or loss to be offset.

5.7.35 Where complete avoidance of potential effects is not feasible during refinement of the site design, additional measures are identified to reduce effects. These include a range of mitigation proposals such as the use of construction methods, avoidance of sensitive habitats, landscaping and site operation activities. Mitigation measures follow standard



techniques and best practice and are therefore considered to be effective for the purposes of assessment.

Monitoring

5.7.36 Also incorporated, where appropriate, are monitoring measures to ensure that the Proposed Development and any mitigation measures perform as required.

5.7.37 The EIA Report sets out details of any post-consent monitoring which is proposed. This includes, where appropriate, proposals to measure the effectiveness of the identified mitigation measures.

Consideration of Transboundary Effects

5.7.38 In accordance with the EIA Regulations, the assessment has considered 'transboundary effects'. Regulation 41 of the EIA Regulations refers to development with significant transboundary effects as being developments proposed to be carried out in Scotland that are "*likely to have significant effects on the environment in an EEA State*". The nature of the Proposed Development and the location of the application site are such that significant transboundary effects are not predicted for the Proposed Development.

5.8 Statement of Significance

5.8.1 Assessing the significance of effects relies, at least in part, on value judgements including placing weight or value on the environment likely to experience the change.

5.8.2 The significance of an effect is derived from an analysis of:

- The sensitivity of the receiving environment or receptor to change, including its capacity to accommodate the kinds of changes the Proposed Development may bring about;
- The amount and type of change, often referred to as the impact magnitude which includes the timing, scale, size and duration of the impact;
- The likelihood of the impact occurring – which may range from certainty to a remote possibility;
- Comparing the impacts on the environment which would result from the Proposed Development with the changes that would occur without the Proposed Development - often referred to as the "*do nothing*" or "*do minimum*" comparison; and
- Expressing the significance of the effects of the project, usually in relative terms, based on the principle that the more sensitive the resource, the more likely the changes and the greater the magnitude of the changes, compared with the do nothing comparison, the greater will be the significance of the effect.

5.8.3 As the significance of effects will differ depending on the context and the 'receptors' affected by the Proposed Development, there is no general definition of what constitutes significance. In EIA, the term significance reflects both its literal meaning of 'importance' and its statistical meaning where there is an element of quantification. This combination of judgemental/subjective and quantifiable/objective tests has become the standard approach to understanding and applying the test of 'significance'.

5.8.4 Significant effects are defined in each of the topic specific chapters. Any effects associated with the Proposed Development are considered to be negative except where it is stated that they are positive. An effect assessed as significant does not



necessarily mean it is unacceptable; other factors such as mitigation require to be taken into account.

5.9 Assumptions, limitations and Technical Difficulties

- 5.9.1 The EIA process is designed to enable good decision-making based on the best possible available information about the environmental implications of a proposed development.
- 5.9.2 It is not considered that any matter has prevented the accurate assessment of potential environmental impacts or the identification of appropriate mitigation measures. The environmental impacts reported in this EIA Report, and the level of mitigation described, effectively sets the minimum standard which will be achieved by the final development. The applicant has a commitment to ensuring that, where details of the Proposed Development differ from those assessed in the EIA, the Proposed Development will not have any adverse environmental impacts which are significantly worse than those which have been assessed in the EIA and reported in this EIA Report.

5.10 References

NatureScot (2021). Assessing the cumulative landscape and visual impact of onshore wind energy developments. Available at: <https://www.nature.scot/doc/guidance-assessing-cumulative-landscape-and-visual-impact-onshore-wind-energy-developments>

Scottish Government (1997). Town and Country Planning (Scotland) Act 1997 (as amended). Available at: <https://www.legislation.gov.uk/ukpga/1997/8/contents>

Scottish Government (2017). Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017. Available at: <https://www.legislation.gov.uk/ssi/2017/102/contents>

Scottish Government (2017). Planning Circular 1/2017: Environmental Impact Assessment Regulations. Available at: <https://www.gov.scot/publications/planning-circular-1-2017-environmental-impact-assessment-regulations-2017/>

5.11 Abbreviations List

Abbreviation	Meaning
EEA	European Economic Area
EIA	Environmental Impact Assessment
NTS	Non-Technical Summary
PAC	Pre-Application Consultation



Making Sustainability Happen



Chapter 6: Scoping and Consultation

Environmental Impact Assessment Report

Cairnoch Hill Wind Farm

3 August 2026



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Revision	Prepared By	Checked By	Approved By	Description
01	V. Ramirez	M. Roberts	A. Smith	-



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6.0 Introduction

6.1 Introduction

6.1.1 This chapter sets out the scoping process undertaken as part of the Environmental Impact Assessment (EIA) for the proposed Cairnoch Hill Wind Farm (“the Proposed Development”). It also details additional consultation that has been undertaken in respect of the Proposed Development.

6.1.2 The purpose of scoping and consultation is to:

- Ensure that statutory consultees and other bodies with a particular interest in the environment are informed of the Proposed Development and are provided with an opportunity to comment at an early stage in the EIA process;
- Obtain baseline information regarding existing environmental conditions at the location of the Proposed Development (“the Site”);
- Establish key environmental issues and identify potential effects to be considered during the EIA;
- Identify those issues which are likely to give rise to significant environmental effects and therefore which require more detailed study and those which can be justifiably excluded from further assessment;
- Provide focus to the EIA process so that assessment is focussed in areas where there is likely to be significant effects; and
- Provide a means of confirming the most appropriate methods of assessment.

6.2 Scoping

6.2.1 A request for an EIA Scoping Opinion was submitted to Stirling Council on 11 September 2024, with a Scoping Opinion issued on 13 November 2024. The matters raised within the Scoping Opinion have informed the scope, content, and methodology of this EIA Report. The outcomes of the scoping exercise, including consultees’ responses and how these have been addressed, are described in the sections that follow and summarised in **Technical Appendix 6.1: Scoping Response Table**.

6.2.2 The list of organisations consulted that responded and the date of the response is shown in **Table 6-1**. It should be noted that some responses were received after the Scoping Opinion was issued by Stirling Council.

Table 6-1: Scoping Consultees (Responses)

Consultee	Scoping Response Date
BAA (Glasgow Airport)	16 October 2024
Historic Environment Scotland (HES)	31 October 2024
Cumbernauld Airport	30 September 2024
NATS Safeguarding	31 October 2024
Defence Infrastructure Organisation	11 October 2024
NatureScot	11 October 2024
Carron Valley and District Community Council	14 October 2024
Scottish Environment Protection Agency (SEPA)	14 October 2024
British Horse Society	14 October 2024



Consultee	Scoping Response Date
Gargunnoch Community Council	31 October 2024
Scottish Water	04 October 2024
Scottish Wildlife Trust	25 November 2024
Scottish Rights of Way and Access Society (ScotWays)	08 January 2025
Forth District Salmon Fisheries Board	13 January 2025
Scottish Forestry	13 February 2025
British Telecom (BT)	17 December 2024

6.2.3 The List of organisations Consulted that did not respond are shown in **Table 6-2**.

Table 6-2: Scoping Consultees (No Response)

Consultee
North Lanarkshire Council
Falkirk Council
East Dunbartonshire Council
Airwave Solutions Ltd
Atkins
BAA Aerodrome Safeguarding (Edinburgh)
Civil Aviation Authority
Crown Estate Scotland
Fisheries Management Scotland
Forth Rivers Trust
John Muir Trust
Joint Radio Company
Marine Science Scotland
Mountaineering Scotland
MBNL
Ofcom
RSPB Scotland
Scottish Wild Land Group (SWLG)
Telefonica
Transport Scotland
Woodlands Trust
Visit Scotland
Vodafone
Cambusbarron Community Council
Fintry Community Council



Consultee
Queenzieburn Community Council
Denny, Dunipace, Head of Muir and Dennyloan Community Council
St Ninians Community Council
Plean Community Council

- 6.2.4 A summary of the key issues raised at Scoping is provided in **Technical Appendix 6.1: Scoping Response Table**. Where appropriate, sections of the Scoping Opinion (and relevant consultee Scoping responses) are detailed in the consultation tables contained within each EIA Report technical topic chapter, with reference to how the comments have been addressed.
- 6.2.5 The EIA Report has been prepared with regard to the Scoping Opinion (in accordance with regulation 5(3) of the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017) issued by Stirling Council in November 2024.

6.3 Matters Scoped Out of Detailed Considerations

- 6.3.1 An assessment of the potential effects of the decommissioning of the Proposed Development have been scoped-out of the EIA as impacts during decommissioning are expected to be similar to, or no worse than those predicted for construction. Also noted at this stage, future baseline conditions cannot be predicted accurately and both the proposals for refurbishment/decommissioning and the future regulatory context are unknown. See **Chapter 5: EIA** for further detail.
- 6.3.2 Paragraph 76 of Planning Circular 1/2017 is clear that it is the ‘significant’ environmental effects to which a proposed development is likely to give rise that should be the primary focus of the EIA Report and that the requirement *“is to include the information that may reasonably be required for reaching a reasoned conclusion on the significant effects of the project on the environment”*. Other lesser impacts may need *“only brief treatment to indicate that their possible relevance has been considered”*.
- 6.3.3 Paragraph 3.1 of PAN 1/2013 similarly outlines that EIAs should be proportionate and fit for purpose. *“Proportionality can best be achieved by seeking information from the planning authority and the Consultation Bodies on the scope of the assessment, paying attention to their views from the outset, and by focussing on the significant environmental effects of the proposed development”*. A similar emphasis is contained at paragraph 5.4 of PAN 1/2013 that outlines that the EIA Report should contain a clear analysis of the significant areas of impact and should highlight key issues relevant to the decision.
- 6.3.4 On the basis of the desk based and survey work undertaken, the professional judgement of the EIA team, experience from other relevant projects, policy guidance or standards, and with the agreement of the consultees, a number of topic areas have been ‘scoped out’. The following main issues have been scoped out of the EIA:

Landscape and Visual

- 6.3.5 Following consultation with Stirling Council and NatureScot, and informed by the Zone of Theoretical Visibility (ZTV) analysis, the following matters have been scoped out of the Landscape and Visual Impact Assessment (LVIA):



- Effects on Landscape Character Types located beyond 20km of the proposed wind turbines;
- Effects on National Scenic Areas and National Parks, where ZTV analysis demonstrates limited or no potential for significant effects;
- Effects on Wild Land Areas, including WLA 07 (Ben More – Ben Ledi) and WLA 04 (Waterhead Moor – Muirshiel), due to distance, limited theoretical visibility and the presence of intervening landform and existing development; and
- Cumulative landscape and visual effects associated with wind farm developments beyond the defined 20km cumulative LVIA study area, or where wind turbines are at an early scoping stage only and not considered relevant to cumulative assessment.

6.3.6 Full details of the LVIA scope are provided in **Chapter 7: Landscape and Visual**.

Ecology

6.3.7 Ecological receptors have been scoped out of detailed assessment where it has been demonstrated that there is no potential for significant ecological effects, or where features are not considered important at a local or higher level, are not Groundwater Dependent Terrestrial Ecosystems (GWDTEs), and are not subject to statutory protection.

6.3.8 Further justification is provided in **Chapter 8: Ecology**.

Ornithology

6.3.9 No ornithological topic areas have been fully scoped out of the assessment. However, in accordance with NatureScot guidance (2017), the assessment focuses on key species of greatest relevance, and effects on statutory ornithological sites beyond 20km of the Site boundary have been scoped out due to lack of ecological connectivity.

6.3.10 Details are provided in **Chapter 9: Ornithology**.

Hydrology, Hydrogeology, Geology and Soils

6.3.11 The following topics have been scoped out of detailed assessment:

- Effects on geology, with the exception of peat and carbon-rich soils;
- A detailed Flood Risk Assessment, Drainage Impact Assessment and baseline water quality monitoring, as existing data sources confirm that these receptors are not at risk from the Proposed Development; and
- Detailed geomorphological assessment, which will be addressed through separate regulatory processes as required.

6.3.12 These decisions are explained in **Chapter 10: Hydrology, Hydrogeology, Geology and Soils**.

Cultural Heritage and Archaeology

6.3.13 The scope of assessment for cultural heritage and archaeology has been informed by desk-based appraisal, initial field reconnaissance, professional judgement, and consultation undertaken as part of the EIA scoping process. The assessment has been designed to be proportionate, focusing on those heritage assets where there is a realistic potential for significant effects arising from the Proposed Development.

6.3.14 In accordance with best practice guidance and the approach set out in the Scoping Report, the assessment of impacts on setting has been limited to a 10km study area



from the proposed wind turbine locations. Within this area, designated cultural heritage assets have been appraised in relation to intervisibility, contribution of setting to significance, and potential for change arising from the Proposed Development.

- 6.3.15 The above reflects established practice, including guidance in the NatureScot and Historic Environment Scotland EIA Handbook, and have been made on the basis that effects on these assets would not be significant in EIA terms. The cultural heritage assessment presented in **Chapter 11: Cultural Heritage and Archaeology** therefore focuses on those assets where there is a credible pathway for significant direct, indirect, or setting-related effects.

Traffic and Transport

- 6.3.16 The scoping process identified that the potential for significant traffic and transport effects is confined to the construction phase of the Proposed Development, when abnormal loads, delivery of plant and materials, and workforce movements would occur.
- 6.3.17 Traffic impacts associated with the operational phase have been scoped out of detailed assessment. Once operational, the wind farm would generate only limited vehicle movements associated with routine maintenance, inspections, and occasional component replacement, and these movements are not anticipated to exceed baseline traffic levels in a manner that would result in significant effects.
- 6.3.18 Similarly, traffic impacts associated with the decommissioning phase have been scoped out. Decommissioning activities are expected to be similar in nature and scale to construction, and the environmental effects arising from traffic during this phase would be comparable to, or less than, those assessed for construction. As such, further standalone assessment of decommissioning traffic is not considered necessary.
- 6.3.19 The traffic and transport assessment presented in **Chapter 12: Traffic and Transport** therefore focuses solely on construction-related effects, including abnormal load movements, construction traffic routing, and potential interactions with the local road network.

Noise

- 6.3.20 The scope of the noise assessment has been informed by the separation distances between the proposed wind turbines and nearby noise-sensitive receptors, previous experience of comparable wind farm developments, and consultation during scoping.
- 6.3.21 The following matters have been scoped out of detailed assessment:
- Decommissioning noise, on the basis that noise effects during decommissioning are expected to be comparable to those during construction and would be temporary in nature;
 - Ground-borne vibration, as construction activities are not anticipated to generate vibration levels that would be perceptible or harmful at nearby sensitive receptors; and
 - Low-frequency noise and amplitude modulation, consistent with current national guidance and established planning practice, recognising that there is no robust evidence linking these effects to adverse health outcomes and that they are unpredictable and not routinely controlled through planning conditions.
- 6.3.22 The detailed noise assessment presented in **Chapter 13: Noise** therefore focuses on construction noise (where relevant) and operational wind turbine noise, including cumulative noise effects with other nearby wind farms where required.



Aviation

6.3.23 Aviation issues were considered at the scoping stage through desk-based review and consultation with relevant aviation stakeholders. This included consideration of civil and military aviation interests, radar systems, safeguarding zones, and licensed and unlicensed aerodromes.

6.3.24 Based on the information available at scoping and feedback received, the following aviation receptors have been scoped out of detailed assessment:

- Ministry of Defence radar systems, where modelling indicated no adverse interference;
- NATS civil aviation radars, where consultation responses confirmed no safeguarding objections; and
- Licensed and unlicensed aerodromes, gliding sites, and hang-gliding locations outside the agreed consultation distances, where no conflict was identified.

6.3.25 Aviation effects that remain relevant, including turbine lighting requirements and any necessary safeguarding measures, are addressed in **Chapter 14: Aviation**, with mitigation measures identified where appropriate.

6.4 Post Scoping Consultation

6.4.1 Following the formal scoping process, consultation (replying to scoping responses) was undertaken with a number of organisations regarding specific issues raised at scoping. In particular, follow up consultation was undertaken with:

- Historic Environment Scotland; and
- NatureScot.

6.4.2 Detail of the consultation carried out is provided in the relevant technical Chapters (EIA Report **Chapter 7 to 15**).

6.5 Further Consultation

6.5.1 separate to the formal scoping process, further consultation has been undertaken with relevant consultees, to help inform the EIA.

Civil Aviation Authority (CAA)

6.5.2 An aviation lighting scheme has been designed and has been submitted to the CAA for approval. A letter to the CAA regarding the proposed aviation lighting scheme is also provided in **Technical Appendix 14.1** of the EIA Report.

Met Office

6.5.3 Consultation was held with the Met Office throughout 2024, 2025 and 2026 regarding the Holehead Met Office radar south west of the Site. In April 2025 the Met Office confirmed that the Site layout at that time (four wind turbines at tip heights of between 200m and 180m) would avoid unacceptable effects on the Holehead radar. In June 2026 the Met Office reviewed the design freeze wind turbine layout and confirmed there would be no unacceptable effects on the Holehead radar.

6.6 Community Consultation

6.6.1 Public consultation is a key element of the environmental assessment process; therefore, as part of the wider consultation process, attention was given to community engagement in cognisance of Planning Circular 1/2017. Local Community Councils were contacted during development of the proposals.



- 6.6.2 In addition to the consultation as part of the scoping process, consultation has been undertaken with the local communities in the form of public exhibitions and meetings.
- 6.6.3 The following Community Councils / groups were invited to the public exhibitions held in November 2024 and March, April and June 2026:
- Carron Valley and District Community Council;
 - Cambusbarron Community Council;
 - Gargunnock Community Council;
 - Fintry Community Council;
 - Kippen Community Council;
 - Queenzieburn Community Council;
 - Denny, Dunipace, Head of Muir and Dennyloan (now Denny & District) Community Council;
 - St Ninians Community Council; and
 - Plean Community Council.
- 6.6.4 Local councillors were invited to attend these public exhibitions also.
- 6.6.5 The Applicant has met with a number of community councils and community groups in order to discuss the Proposed Development and also options for the associated community benefit.
- 6.6.6 Further details of the public exhibitions and community consultation held in respect of the Proposed Development are contained in the **Pre Application Consultation Report**, submitted as part of the application for the Proposed Development.

6.7 References

Scottish Government (2013). Planning Advice Note 1/2013: Environmental Impact Assessment. Available at: <https://www.gov.scot/publications/planning-advice-note-1-2013-environmental-impact-assessment/>

Scottish Government (2017). Planning Circular 1/2017: Environmental Impact Assessment Regulations. Available at: <https://www.gov.scot/publications/planning-circular-1-2017-environmental-impact-assessment-regulations-2017/>

Scottish Government (2017). Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017. Available at: <https://www.legislation.gov.uk/ssi/2017/102/contents>

6.8 Abbreviations List

Abbreviation	Meaning
EIA	Environmental Impact Assessment
GWDTE	Groundwater Dependent Terrestrial Ecosystem
HES	Historic Environment Scotland
LVIA	Landscape and Visual Impact Assessment
NATS	National Air Traffic Services
PAN	Planning Advice Note
SAC	Special Area of Conservation



Abbreviation	Meaning
SEPA	Scottish Environment Protection Agency
SSSI	Site of Special Scientific Interest
ZTV	Zone of Theoretical Visibility



Making Sustainability Happen



Chapter 7: Landscape and Visual Environmental Impact Assessment Report

Cairnoch Hill Wind Farm

3 August 2026



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Revision	Prepared By	Checked By	Approved By	Description
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7.0 Landscape and Visual

7.1 Introduction

- 7.1.1 This chapter of the Environmental Impact Assessment (EIA) Report presents the Landscape and Visual Impact Assessment (LVIA) for the Proposed Development. It has been prepared and reviewed by Chartered Members of the Landscape Institute at SLR Consulting Ltd (“SLR”), a registered practice with the Landscape Institute.
- 7.1.2 The Proposed Development comprises up to four wind turbines (up to 180m to blade tip), and associated infrastructure, as described in **Chapter 3: Description of the Development**. The wind turbine layout consists of four wind turbines of up to 180m to blade tip height, which would possess the same dimensions. Candidate turbines with a hub height of between 99m and 105m and a rotor diameter of between 150m and 162m are being considered. To account for the slight differences in the proportions of the candidate turbine models, the candidate turbine model with the largest proposed rotor diameter of 162m (and lower hub height) has been considered for the assessment of effects during daytime, while the candidate turbine model with the highest hub height of 105m has been considered for the assessment of effects during night-time. These dimensions are reflected in the supporting visualisations and evaluated in the assessment as this is considered to depict the likely worst-case scenarios in relation to landscape and visual effects. Where visible, the permanent met mast and other infrastructure associated with the Proposed Development are also rendered on the supporting photomontage visualisations.
- 7.1.3 The LVIA considers the effects of the Proposed Development on the fabric of its location (“the Site”), on landscape character and visual amenity. An assessment of cumulative effects in conjunction with other wind farms and also night-time effects is integrated into the assessment of individual landscape and visual receptors contained within this chapter (rather than within separate technical appendices). This chapter includes the following sections:
- Scope and Consultation;
 - Approach and Methods;
 - Baseline Conditions;
 - Assessment of Physical Landscape Effects;
 - Assessment of Effects on Landscape Character;
 - Assessment of Visual Effects;
 - Assessment of Visible Aviation Lighting; and
 - Summary and Statement of Significance.
- 7.1.4 The chapter is supported by:
- GIS Figures (**Figures 7.1-7.16**) contained in EIA Report Volume 3a;
 - Viewpoint visualisations (**Figures 7.17-7.34**) contained in EIA Report Volume 3b;
 - **Technical Appendix 7.1: Landscape and Visual Impact Assessment Methodology**; and
 - **Technical Appendix 7.2: Residential Visual Amenity Assessment.**



- 7.1.5 A list of the policy and guidance documents relative to the LVIA is provided in **Technical Appendix 4.1**.
- 7.1.6 Unless stated otherwise, in this chapter where distances are stated they relate to the distance between the receptor and the closest proposed wind turbine associated with the Proposed Development.

7.2 Scope and Consultation

Consultation

- 7.2.1 Consultation with regards to potential landscape and visual effects was undertaken with the organisations shown in **Table 7-1**.

Table 7-1: Consultation Responses

Consultee	Summary of Key Issues	Where Addressed in Chapter
Stirling Council Pre Application Enquiry Response 7 May 2024	<i>"In response to your questions on location:</i> <i>Stirling has a unique and varied landscape, with a remarkable mix of high and lowland areas arranged around the Forth Valley. Within this composition are also a number of distinct and well-known landmarks, including; The Sherifmuir Battlefield; The Wallace Monument; Stirling Castle; The Bannockburn Memorial and Battlefield; Highland Boundary Fault zone; Ochil Hills escarpment; Touch, Gargunnock and Fintry Hills and the Campsie Fells escarpment; and Flanders Moss. These should all be considered as iconic landscape features in any impact assessment. There is also a range of wind energy developments of varying scales in the area, some of which form prominent visual foci in the landscape, both by themselves and cumulatively.</i> <i>The Carron Valley is an attractive landscape focussed around the Carron Valley Reservoir. Although there are windfarms nearby, these are not considered to be dominant features in this landscape. 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. A full Landscape and Visual Impact Assessment would be required to determine the impacts on landscape character.</i> <i>The Stirling Landscape Sensitivity and Capacity Study for Wind Energy Developments, updated in January 2015, includes an assessment of the key characteristics and sensitivities of separate landscape types/sub-types in relation to wind energy development. Of particular relevance to this proposal are the sections on Landscape type/sub-type 3 'Forested River Basin' (pp 87-91) within which turbines 1.2 and 3 are situated; and Landscape type</i>	Landscape and visual effects on the Sherifmuir Battlefield; The Wallace Monument; Stirling Castle; The Bannockburn Memorial and Battlefield; Highland Boundary Fault zone; Ochil Hills escarpment; Touch, Gargunnock and Fintry Hills and the Campsie Fells escarpment; and Flanders Moss are considered in the LVIA. The relationship of the Proposed Development with other nearby proposed, consented and operational wind farms, and their cumulative effects on landscape character is considered in Section 7.7. The Stirling Landscape Sensitivity and Capacity Study for Wind Energy Developments has informed the assessment of landscape effects in Section 7.7. The cumulative landscape and visual assessments have considered all relevant proposed, consented, under-construction and operational wind farms in the Study Area at the time



Consultee	Summary of Key Issues	Where Addressed in Chapter
	<i>7 Lowland Hills (pp 106-113) within which turbine 4 and other operational wind farms are situated.</i> <i>The guidance also takes account of the findings of the updated study regarding the landscape capacity for further wind energy development in each Landscape Type/Landscape Sub-Type. Table 1 (pp 21/22) suggests the following;</i> - <i>In the Forested River Basin there is no capacity for any typologies</i> - <i>In the Lowland Hills, in the Fintry, Gargunnock and Touch Hills only 15-50m (low capacity), 51-110m (low capacity) and 10m + (low capacity).</i> <i>Further development of up to 10 turbines may be appropriate subject to compliance with strict locational, siting and design criteria, however consent has already been granted on appeal for 7 no. 125m turbines at Craigton, which although not yet implemented (September 2017), significantly reduces identified capacity. Account will also be taken of a now constructed single turbine (102m) in the vicinity of the Craigannet wind farm.</i> <i>The guidance defines Low Capacity as:- A landscape that is both highly sensitive to wind turbine development and has a high value, where only a slight level of change can be accommodated without significantly adversely affecting any of the key defining characteristics of the landscape</i> <i>Since the guidance was produced there have been further developments in the area;</i> - <i>In February 2022 planning permission was granted for an amended scheme on the Craigton site (now known as Shelloch), comprising of five wind turbines, two having maximum blade tip height of 180m, three with maximum blade tip height of 149.5m (Ref. No. 20/00840/FUL). No work has yet started on site.</i> - <i>The Scottish Government's Energy Consents Unit is currently determining a Section 36 application comprising of eleven turbines, up to 180m to blade tip, battery energy storage system and associated infrastructure, total installed capacity expected to be greater than 50 MW, directly north east of the operational Earlsburn Wind Farm, (Ref. no. 23/00092/NST)</i> - <i>Another proposal in the locality, comprising of four wind turbines, each with a blade tip height of up to 180 metres and an estimated overall capacity of up to 30MW has been the subject of a pre-application</i> - <i>notification. Information on this project is available at</i>	of the cumulative project cut-off date.



Consultee	Summary of Key Issues	Where Addressed in Chapter
	https://drummarnockwindfarm.co.uk/project-info <i>There was also a refused planning application on this site for 15 wind turbines of up to 126 metres in height under application number 12/00515/FUL, with an appeal dismissed. Although it is acknowledged that the policy position has altered significantly since 2012 with a more permissive attitude towards windfarms, if the locational impacts are found to have an adverse impact on the landscape character of the area they will be avoided.</i> <i>“In response to your questions on viewpoints:</i> <i>I can agree with viewpoints used for wirelines and also the list of supplementary viewpoints being considered for inclusion. In my opinion consideration should also be given to viewpoints at the Wallace Monument and Dumyat, and in relation to potential impacts on the Loch Lomond and Trossachs National Park. Also Mountain viewpoints, respectively the Lodge Forest Visitor Centre Aberfoyle and Ben Ledi are likely required.</i> <i>As the turbines will require aviation warning lights due to their height, appropriate viewpoints should also be selected for lowlight/night time montages as they will likely be seen from some distance.”</i> <i>“In response to your questions on Layout:</i> <i>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. The supporting guidance does suggest that impacts on aviation radar and met office radar will be taken into consideration, and on other applications we have received objections from various consultees as the area to the north of the Carron Valley Reservoir is a popular route for light aircraft. There may be a technological solution to this, but you may want to explore flight paths in more detail and enter into negotiations with these parties, to try minimise any potential disruption, to try mitigate against any adverse effects.</i> <i>The attached guidance and capacity study provides further advice on these matters. Attention is particularly drawn to para. 31 in the guidance that all aerodromes should be safeguarded, including established smaller facilities at Thornhill and Cumbernauld, as well as the larger Glasgow and Edinburgh airports.”</i>	Viewpoints at the Wallace Monument, Dumyat, Ben Ledi, and the Lodge Forest Visitor Centre Aberfoyle have been included in the LVIA. Photomontages have been produced for each of these viewpoints, with the exception of the Lodge Forest Visitor Centre, which as agreed with NatureScot is illustrated with a wireline only. Visualisations for four night-time viewpoints have been included in the LVIA. These viewpoints are located at varying distances from the Proposed Development to illustrate the potential effects across the Detailed Study Area. An assessment of Visible Aviation Lighting has been incorporated into the LVIA in Section 7.9, which includes figures and visualisations that illustrate the ZTV and appearance of the lights across the Study Area.
Stirling Council Scoping Response	<i>“The site is situated within the Lowland Hills: Fintry, Gargunnoch and Touch Hills landscape character type. It has been identified for its simplicity, unity and openness which are seen as positive attributes of this landscape character type, together with the close visual interrelationship between the</i>	The simple design of the Proposed Development is considered to reflect the relatively simple characteristics of the local landscape.



Consultee	Summary of Key Issues	Where Addressed in Chapter
31 October 2024	<i>escarpment line and the neighbouring carselands and hill slopes that are overlooked by it. The site is also situated with the LDP designated Southern Hills Local Landscape Area ("LLA"), which is considered a special landscape for protection.</i> <i>Stirling Council's supplementary guidance on Wind Energy Developments note that the capacity for wind farm developments in the Fintry, Gargunnock and Touch Hills landscape character type is constrained due to its iconic landscape features. Some development may be appropriate in this area subject to compliance with strict locational, siting and design criteria. However, generally, capacity in this area is low.</i> <i>The EIA should take account of the visual impact of the turbines on the landscape character, views and integration within this sensitive landscape. Consideration should be given to the potential effects of the development upon the character of the LLA and how they are experienced in relation to the proposed development.</i> <i>The EIA should assess the landscape implications of the proposed development using best practice guidance (see: https://www.nature.scot/professional-advice/planning-and-development/planning-and-development-advice/renewable-energy/onshore-wind-energy/wind-farm-impacts-landscape).</i> <i>NatureScot advise that the scope of the LVIA study area (45km) is appropriate for the EIA and are content that a detailed LVIA will also be conducted. Key issues that require to be addressed within the EIA however are:</i> <i>- The growing number of existing and consented windfarms adjacent and in proximity to the site. The development will require careful consideration to the scale, height, speed of blade, lighting and design layout to avoid a complex wind farm configuration emerging.</i> <i>- Aviation lighting, which is likely be an issue if turbine height remains at the proposed height, or above the 150m threshold. Lights are likely to be visible from Ben Ledi and other tops in the Wild Land Area ("WLA"), and from the Loch Lomond & the Trossach's National Park.</i> <i>- The LVIA, should include assessment of impacts on the Special Landscape Qualities of the Loch Lomond & the Trossach's National Park.</i> <i>The relationship of the proposed development with constructed wind farms and consented wind farms should be assessed (paired ZTVs or CZTV should be restricted to the most relevant schemes). The cumulative assessment should address the inter-visibility of the proposed development with other wind farms or transmission infrastructure, both</i>	An assessment of the Proposed Development's potential effects on the Southern Hills LLA is provided in Section 7.7. The LVIA has been undertaken in accordance with latest relevant guidance produced by the Landscape Institute and NatureScot. In agreement with NatureScot, a 45km Study Area forms the basis of the LVIA. The relationship of the Proposed Development with other proposed, consented and operational wind farms has been considered in the design of the Proposed Development. Additionally, the cumulative landscape and visual assessments have considered all relevant proposed, consented, under-construction and operational wind farms in the Study Area at the time of the cumulative project cut-off date. An assessment of Visible Aviation Lighting has been incorporated into the LVIA in Section 7.9, which includes figures and visualisations that illustrate the ZTV and appearance of the lights across the Study Area. The Study Area and Detailed Study Area extend across the Gargunnock Community Council area, and as a result areas of predicted theoretical visibility associated with the



Consultee	Summary of Key Issues	Where Addressed in Chapter
	<i>constructed and consented, from key viewpoints, including sequential views.</i> <i>Gargunnock Community Council have request that the ZTV is widened to include the neighbouring villages, including Gargunnock itself."</i>	Proposed Development are illustrated on the LVIA figures.
NatureScot Scoping Response 11 October 2024	<i>"We advise that the scope of the LVIA study area (45km) is appropriate and are content that a detailed LVIA will also be conducted, with a radius of 20km. Key issues that require to be addressed within the EIAR are:</i> <i>• A growing number of existing and consented windfarms adjacent and in proximity to the site. The development will require careful consideration to the scale, height, speed of blade, lighting and design layout to avoid a complex wind farm configuration emerging.</i> <i>• Aviation lighting, which is likely be an issue if turbine height remains at the proposed height, or above the 150m threshold. Lights are likely to be visible from Ben Ledi and other tops in the Wild Land Area (WLA), and from the Loch Lomond & The Trossachs National Park (LL&TNP).</i> <i>• The LVIA, which should include assessment of impacts on the Special Landscape Qualities of the LL&TNP."</i>	In agreement with NatureScot, a 45km Study Area and 20km Detailed Study Area form the basis of the LVIA. The relationship of the Proposed Development with other proposed, consented and operational wind farms has been considered in the design of the Proposed Development. Additionally, the cumulative landscape and visual assessments have considered all relevant proposed, consented, under-construction and operational wind farms in the Study Area at the time of the cumulative project cut-off date. An assessment of Visible Aviation Lighting has been incorporated into the LVIA in Section 7.9, which includes figures and visualisations that illustrate the ZTV and appearance of the lights across the Study Area. Further consultation undertaken in relation to whether an assessment of the Proposed Development's landscape and visual effects on the Special Landscape Qualities (SLQs) of the Loch Lomond and The Trossachs National Park is required.
NatureScot E-mail correspondence	<i>"We can advise that we do not consider there to be likely significant effects on the SLQs of the Park as a result of this proposal. Our view is that the AESLQ [Assessment of Effects on Special Landscape</i>	An assessment of the Proposed Development's landscape and visual effects on the SLQs of the



Consultee	Summary of Key Issues	Where Addressed in Chapter
29 January 2025	Qualities] for the Park can be scoped out and that an assessment is therefore not required. <i>I can also advise that the Loch Lomond and The Trossachs National Park (LLTNP) are in agreement with this opinion."</i>	Loch Lomond and The Trossachs National Park is not included in the LVIA.
Stirling Council E-mail correspondence 5 February 2025	E-mail sent by the author of the LVIA to NatureScot and Stirling Council to confirm list of viewpoints for the LVIA.	No further comments received from Stirling Council. Following subsequent public consultation, an additional viewpoint was included at Carron Valley Hamlet, which is representative of views from some of the closest residential properties. The final viewpoint list is provided in Table 7-6 .
NatureScot E-mail correspondence 6 February 2025	<i>"Thank you for this draft final viewpoint list for the Carron Valley Wind Farm LVIA, which includes the addition of 3 viewpoints and the removal of 2. I can confirm that we have no comment to make with regard to these alterations."</i>	The final viewpoint list provided in Table 7-6 .

Scoped into the Assessment

- 7.2.2 This assessment covers the direct and indirect effects arising from the construction, operational phase and decommissioning of the Proposed Development. The effects associated with the construction phase would be short-term and temporary in nature, while the effects associated with the operational phase would be long-term and temporary. The decommissioning effects would be similar in magnitude to the construction effects.
- 7.2.3 A summary of the receptors that are scoped into the detailed assessment later in this Chapter is provided in the 'Summary of Baseline Conditions and Preliminary Assessment' in Section 7.5.

Scoped out of the Assessment

- 7.2.4 On the basis of the desk based and site survey work undertaken, the professional judgement of the EIA team, experience from other relevant projects, policy guidance / standards, and feedback received from consultees, and as agreed through the Scoping process, the following effects have been scoped out of this LVIA:
- Effects on Landscape Character Types (LCTs) lying beyond a 20km radius of the Proposed Development and also where the influence of the Proposed Development on the LCT would be limited (see **Table 5-3**);
 - Effects on all national landscape designations, including National Parks;
 - Effects on Wild Land Areas;



- The cumulative effect of the Proposed Development in the context of wind farms that lie beyond a 20km radius from the proposed wind turbines;
- The cumulative effect of the Proposed Development in the context of scoping stage or pre-application stage wind farms;
- Effects arising from the process of decommissioning since they are of a similar nature to construction issues, but of a smaller scale and shorter duration. However, the results of decommissioning (i.e. the removal of the wind farm) are taken into account in assessing on-going and operational effects where appropriate.

7.2.5 Further justification for Scoping out these receptors is provided in Section 7.4 (Baseline Conditions).

7.3 Approach and Methods

Study Area

- 7.3.1 The initial step in the LVIA is the establishment of the study area for the assessment. Guidance developed by NatureScot (Visual Representation of Wind Farms Version 2.2, February 2017) indicates that an area with a radius of 45km from the nearest wind turbine is appropriate for wind turbines of the size proposed. This Study Area has therefore been agreed by NatureScot in their Scoping Response, and it is shown on **Figure 7.1**. A Zone of Theoretical Visibility (ZTV) analysis has therefore been carried out for this area (see **Figures 7.6a** and **7.6c** and **7.7a** and **7.7c**), as has mapping of landscape character (**Figure 7.3a-b**), landscape related designations (**Figure 7.4**), and principal visual receptors (**Figure 7.5**).
- 7.3.2 Following a further review of the ZTV for the Proposed Development, it is considered that a 'Detailed Study Area' with a shorter radius of 20km is appropriate to identify any potential significant landscape character and night-time effects. The 20km Detailed Study Area is also shown on **Figure 7.1**.

Desk Study

- 7.3.3 The assessment is initiated through a desk study of the Site and the 45km radius Study Area. This study identifies aspects of the landscape and visual resource that may need to be considered in the landscape and visual assessment, including landscape-related planning designations (i.e. National Scenic Areas), landscape character typology, Wild Land Areas, operational and potential cumulative wind farms, and views from routes (including roads, railway lines, National Cycle Routes, long-distance walking routes and recreational sailing routes), and settlements.
- 7.3.4 The desk study also utilises Geographic Information System (GIS) and Resoft Windfarm software to explore the potential visibility of the Proposed Development. The resultant ZTV maps and wirelines provide an indication of which landscape and visual receptors are likely to be of most relevance in the assessment.

Field Survey

- 7.3.5 Field surveys are carried out throughout the 45km radius Study Area, although the focus is on the areas shown on the ZTV to gain theoretical visibility of the Proposed Development. The baseline field survey has four broad stages:
- A preliminary familiarisation around the Study Area in order to visit the aspects of the landscape and visual resource that have been identified through the desk study and verify their existence and importance. Important features and characteristics that have not become apparent through the desk study are also



identified, and particularly sensitive receptors are noted in order to inform the design process.

- A visit around the Site, in order to establish its potential for wind farm development and identify the most suitable areas for the Proposed Development in landscape and visual terms, along with any constraints that may restrict the area available for development.
- Further field survey around the Study Area, concurrent with the design process for the Proposed Development, to identify those receptors that are likely to be particularly important in the assessment and inform the layout design, possible wind turbine height, and the extent of the Proposed Development.
- The identification of representative viewpoints to include in the landscape and visual assessment, including a wide range of receptors, landscape character, and directions and distances from the Proposed Development.

Methodology for the Assessment of Effects

- 7.3.6 The significance of the potential effects of the Proposed Development has been classified by professional consideration in accordance with legislation and guidance of the sensitivity of the receptor and the magnitude of the potential effect. This section summarises the methodology and guidance used to carry out the LVIA, which is described in full in **Technical Appendix 7.1**.

Categories of Effects

- 7.3.7 The LVIA is intended to determine the potential 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 three categories: landscape effects, visual effects (including daytime and night-time) and cumulative landscape and visual effects.

Assessment of Effects

- 7.3.8 The broad principles used in the assessment of significance of the various categories of effects are the same and are described below. The detailed methodology for the assessment of significance does, however, vary, and the specific criteria used are described in **Technical Appendix 7.1**.
- 7.3.9 The objective of the assessment of the Proposed Development is to predict the likely significant effects on the landscape and visual resource. In accordance with the relevant EIA Regulations, the direct and indirect significant effects of the Proposed Development are identified, described and assessed, and therefore the LVIA effects are assessed to be either significant or not significant.
- 7.3.10 Due to the large scale of the Proposed Development, and the transient nature of the construction and decommissioning processes, it is considered that there would be no instances where construction/decommissioning effects trigger a significant landscape and visual effect for receptors where operational effects are found to be not significant. For this reason, construction and decommissioning effects are not considered separately to the operational effects of the Proposed Development.
- 7.3.11 The significance of effects is assessed through a combination of the sensitivity of the landscape receptor or view and the magnitude of change that would result from the addition of the Proposed Development.



Sensitivity

- 7.3.12 Sensitivity is an expression of the ability of a landscape or visual receptor to accommodate the Proposed Development. Sensitivity is determined through a combination of the value of the receptor and susceptibility to change. The factors that determine these criteria are described in **Technical Appendix 7.1**.
- 7.3.13 Levels of sensitivity - high, high-medium, medium, medium-low and low - are applied in order that the judgement used in the process of assessment is apparent.

Magnitude of Change

- 7.3.14 Magnitude of change is an expression of the extent of the effect on landscape and visual receptors that would result from the introduction of the Proposed Development. The magnitude of change is assessed in terms of a number of variables, including the size and scale of the impact and the extent of the affected area. The factors that determine these criteria are described in **Technical Appendix 7.1**.
- 7.3.15 Levels of magnitude of change - high, high-medium, medium, medium-low, low and negligible/no change - are applied in order that the judgement used in the process of assessment is apparent.

Assessment of Significance

- 7.3.16 The significance and level of effects are assessed through a combination of the sensitivity of the landscape or visual receptor and the magnitude of change that would result from the addition of the Proposed Development. While the methodology in **Technical Appendix 7.1** is not reliant on the use of a matrix to determine a significant or not significant effect, a matrix is included in **Table 7-2** to illustrate how combinations of sensitivity and magnitude of change ratings can give rise to significant effects. On this basis potential impacts are assessed as of negligible, minor, moderate-minor, moderate, major-moderate and major. In those instances where the magnitude has been assessed as 'no change', the level of effect is recorded as 'no effect'.
- 7.3.17 A significant effect occurs where the Proposed Development would provide one of the defining influences on a landscape element, landscape character receptor or view; or where changes of a lower magnitude occur on a landscape element, landscape character receptor or view that is of particularly high sensitivity. A not significant effect occurs where the effect of the Proposed Development is not material, whereby the baseline characteristics of the landscape element, landscape character receptor or view continue to provide the definitive influence, or where the small scale of change experienced by a high sensitivity receptor is such as to be considered not significant.
- 7.3.18 For the purposes of this assessment, any effects with a significance level of major and major-moderate have been deemed significant (dark grey shaded boxes in **Table 7-2**). Moderate levels of effect have the potential, subject to the assessor's professional judgement, to be considered as significant or not significant, depending on the sensitivity and magnitude of change factors evaluated (light grey shaded boxes in **Table 7-2**). Effects within the white boxes are considered to be not significant at either a moderate/ minor, minor or negligible level. In accordance with GLVIA3, experienced professional judgement is applied to the assessment of all effects and reasoned justification is presented in respect of the findings of each case.



Table 7-2: Assessment of Significance Matrix

	Magnitude of Change						
		High	High-Medium	Medium	Medium-Low	Low	Negligible
Sensitivity	High	Major Significant	Major Significant	Major/moderate Significant	Moderate Significant or Not Significant	Moderate/minor Not Significant	Minor Not Significant
	High-Medium	Major Significant	Major/moderate Significant	Moderate Significant or Not Significant	Moderate Significant or Not Significant	Moderate/minor Not Significant	Minor Not Significant
	Medium	Major/moderate Significant	Moderate Significant or Not Significant	Moderate Significant or Not Significant	Moderate/minor Not Significant	Minor Not Significant	Minor Not Significant
	Medium-Low	Moderate Significant or Not Significant	Moderate Significant or Not Significant	Moderate/minor Not Significant	Minor Not Significant	Minor Not Significant	Negligible Not Significant
	Low	Moderate Significant or Not Significant	Moderate/minor Not Significant	Minor Not Significant	Minor Not Significant	Negligible Not Significant	Negligible Not Significant

Nature of Effects

- 7.3.19 The 'nature of effects' relates to whether the effects of the Proposed Development are positive/beneficial or negative/adverse. Guidance provided in GLVIA3 states that "...thought must be given to whether the likely significant landscape and visual effects are judged to be positive (beneficial) or negative (adverse) in their consequences for landscape or for views and visual amenity..." (para. 3.22) but does not provide an indication as to how that may be established in practice. The nature of effect is therefore one that requires interpretation and reasoned professional opinion.
- 7.3.20 Generally, in the development of 'new' wind farms, a precautionary approach is adopted, which assumes that significant landscape and visual effects will be weighed on the adverse side of the planning balance. Unless it is stated otherwise, the effects considered in this assessment are considered to be adverse.

Duration and Reversibility of Effects

- 7.3.21 The duration and reversibility of effects are based on the period over which the Proposed Development is likely to exist and the extent to which it could be removed and its effects reversed at the end of that period. The effects of the Proposed Development are of variable duration, and are assessed as short-term or long-term, and permanent or temporary/reversible. It is anticipated that the operational life of the Proposed Development will be 40 years. The wind turbines, substation and access tracks will be apparent during this time, and these effects are considered to be long-term.



- 7.3.22 Other infrastructure and operations such as the construction and decommissioning processes and plant (including tall cranes for wind turbine erection) and construction compounds will be apparent only during the initial construction period of the Proposed Development and are considered to be short-term effects. Borrow pit excavation will also be short-term, as borrow pits would be restored at the end of the construction process.
- 7.3.23 The reversibility of effects is variable. The most apparent effects on the landscape and visual resource, which arise from the presence of the wind turbines, are temporary/ reversible as the wind turbines would be removed on decommissioning. The effects of the tall cranes and heavy machinery used during the construction and decommissioning periods would also be temporary.
- 7.3.24 Access tracks will be left in-situ, which will reduce potential environmental impacts associated with potential sediment migration into watercourses as a result of removing all tracks. Turbine foundations (except for the top 1m which will be removed) and underground cabling will be left in-situ below ground with no residual landscape and visual effects.
- 7.3.25 In order to avoid repetition, the duration and reversibility of effects are not reiterated throughout the assessment.

Graphic Production

- 7.3.26 The written LVIA is accompanied by a set of graphics contained in EIA Report Volume 3 (3a, 3b and 3c). Reference is made throughout the written text to these graphics, as they are an integral part of the overall assessment and of importance in illustrating specific matters. They should be viewed in accompaniment to the written text.
- 7.3.27 The graphics can be divided into two categories; maps (Volume 3a) and visualisations (Volume 3b and 3c). The maps are based on the 45km Study Area around the Proposed Development and present data of relevance to the assessment, such as the location and extent of landscape designations and Wild Land Areas. ZTV maps are also included. These digitally calculate the extent and level of theoretical visibility across a given area, using Ordnance Survey Terrain 5 mapping as the basis for the calculations. As this terrain model is based only on the 'bare earth', it does not take account of potential screening by vegetation or buildings, and this is why it is referred to as theoretical and not actual visibility. Additionally, lighting intensity ZTV maps show the reduction in lighting intensity that may be achieved through mitigation (e.g. design of the light fitting) and the degree of negative vertical angle of view from the light in relation to landform (further details are provided in **Technical Appendix 7.1**).
- 7.3.28 The visualisations (**Volume 3b and 3c**) are based on the 18 viewpoint locations which are representative of the visual amenity of visual receptors in the area surrounding the Proposed Development. These viewpoints have been agreed with NatureScot. For each viewpoint there is baseline photography, and wirelines of the Proposed Development and the 'bare earth' landform for the same extent as shown in the photography. In accordance with NatureScot's visualisation guidance, the viewpoints also have accompanying photomontages. These use the baseline photography and add onto this a computer-generated model of the Proposed Development, including associated infrastructure such as the access tracks and crane hardstandings, and also the permanent met mast and substation compound. More detailed information on graphic production is included in the Assessment Methodology in **Technical Appendix 7.1**.



- 7.3.29 Where SLR has considered that the Proposed Development infrastructure, including access tracks and onsite substation (including control and metering building), and forestry felling has the potential to contribute to a significant effect, the introduction or removal of these features has been rendered on to the photomontage for viewpoints.

Cumulative Assessment

- 7.3.30 NatureScot's 'Guidance – Assessing the cumulative landscape and visual impact of onshore wind energy development' (2021) is widely used across Scotland to inform the specific assessment of the cumulative effects of wind farms. This guidance provides the basis for the methodology for the cumulative assessment:

“The purpose of a Cumulative Landscape and Visual Impact Assessment (CLVIA) is to describe, visually represent and assess the ways in which a proposed wind farm would have additional impacts when considered with other consented or proposed wind farms. It should identify the significant cumulative impacts arising from the proposed wind farm.”

- 7.3.31 The outcome of this is the identification of any significant cumulative effects that may arise from the addition of the Proposed Development to the cumulative situation, in accordance with NatureScot guidance, which states that cumulative assessment should *“focus on the likely significant impacts and those which are likely to influence the outcome of the consenting process”*.

- 7.3.32 In relation to the significance of cumulative landscape effects, GLVIA3 notes (paragraph 7.28) that *“the most significant cumulative landscape effects are likely to be those that would give rise to changes in the landscape character of the study area of such an extent as to have major effects on its key characteristics and even, in some cases, to transform it into a different landscape type. This may be the case where the project being considered itself tips the balance through its additional effects”*.

- 7.3.33 GLVIA3 (paragraph 7.38) goes on to state the following in relation to the significance of cumulative visual effects:

“Higher levels of significance may arise from cumulative visual effects related to:

developments that are in closer proximity to the main project and are clearly visible together in views from the elected viewpoints;

developments that are highly inter-visible, with overlapping ZTVs – even though the individual developments may be at some distance from the main project and from individual viewpoints, and when viewed individually not particularly significant, the overall combined cumulative effect on a viewer at a particular viewpoint may be more significant”.

- 7.3.34 The methodology used in the assessment of cumulative effects differs in some respects from that used in the rest of the assessment and is described in **Technical Appendix 7.1**. It is important to remember that the objective of the cumulative assessment is different from the assessment of effects of the Proposed Development itself; in the cumulative assessment, the intention is to establish whether or not the addition of the Proposed Development to various scenarios of other relevant existing and proposed wind farms may lead to wind farm development becoming a prevailing characteristic of a view. Two cumulative scenarios are considered:

- The consented scenario; and



- The application-stage scenario.
- 7.3.35 Significant cumulative landscape and visual effects arise where the addition of the proposed wind turbines or other similar/large scale development to a specific baseline, leads to windfarms becoming a prevailing landscape and visual characteristic of a receptor that is sensitive to such change.
- 7.3.36 It should be noted that if the Proposed Development itself is assessed to have a significant effect, it does not necessarily follow that the cumulative effect will also be significant.

Aviation Lighting Assessment

- 7.3.37 The Civil Aviation Authority (CAA) requires that 'en-route obstacles' at or above 150m above ground level are lit with visible lighting to assist their detection by aircraft. As the wind turbines in the Proposed Development are more than 150m to tip height, there is a requirement for the wind turbines to display medium intensity 'steady' red aviation lights at night. Further information in relation to these requirements is provided in **Chapter 14: Aviation**.
- 7.3.38 The assessment of visible aviation wind turbine lighting constitutes an assessment of the effects of visible aviation lighting on views experienced by people at night. The assessment of visible aviation lighting is largely a visual effect because the lighting would not be activated during daylight hours when physical aspects and characteristics of the landscape are most clearly apparent. The assessment of visible aviation lighting therefore focusses on viewpoints and visual receptors and does not apply to landscape character assessment. However, while many aspects of the landscape become indistinct or less distinct during hours of darkness, other characteristics can remain as important features or increase in importance. This is noted in the Guidance on Aviation Lighting Impact Assessment (NatureScot, 2024) (paragraph 21), which states:
- "Some characteristics are weakened by darkness and are ultimately no longer present, as they are less visible, such as evidence of cultural settlement, variations in landcover and habitats, or an appreciation of key vistas. Other perceptual characteristics can however be strengthened, such as the apparent absence of development, or the profile of an important skyline."*
- 7.3.39 The assessment also considers the effect that visible aviation lighting might have on relevant designated areas where there are documented special qualities that are specific to the hours of darkness environment. In this instance, there are no specific SLQs relating to dark skies associated with nearby landscape designations, and there are no Dark Sky Park's (including their buffer zones) in the 45km Study Area.
- 7.3.40 The assessment of visible aviation lighting has been undertaken in accordance with NatureScot's Guidance (NatureScot, 2024), in distinct steps:
- Step 1: Defining the lighting proposal;
 - Step 2: Understanding the baseline; and
 - Step 3: Assessing the effects of the lighting.
- 7.3.41 **Technical Appendix 7.1** describes the detailed methodology used to assess night-time effects.
- 7.3.42 The actual effect/perception of visible aviation lights at the Proposed Development would be dependent on a range of factors, including the distance of the viewer from the Proposed Development, the model and intensity of lights used, the clarity of atmospheric visibility (including the ability to automatically dim the lights during clear



visibility) and the degree of negative vertical angle of view from the light to the receptor.

7.3.43 In summary, the following assumptions have been made in relation to the assessment of effects of visible lighting:

- Red, medium intensity aviation warning lights (2,000cd) would be located on top of the nacelle of the four wind turbines (see **Figure 7.15**). These warning lights would conform to the ICAO specification as set out in Annex 14 Table 6-3 (ICAO, 2018).
- The red, medium intensity aviation warning lights would be controlled with sensor-controlled dimming, such that when the visibility is greater than 5km in horizontal direction from all turbine hubs, the brightness of the lights would be reduced from 2000cd to 200cd (10% of the minimum peak intensity). As dimming is included as embedded mitigation, the assessments (and photomontage visualisations) are based on reduced 200cd intensity aviation lights only, rather than 2000cd intensity in line with guidance (NatureScot, 2024, para 82).
- Vertical directional intensity mitigation is proposed, which could also give rise to reduced lighting intensities depending on the viewpoint location (however these vertical intensity reductions are not factored into the worst-case assessed or photomontages presented). The 'lighting intensity ZTV' in **Figure 7.16** helps to illustrate the reduced lighting intensity within different parts of the Study Area. The figure refers to the vertical directional intensity reductions that would be experienced by one specific light model (CEL-WT-MIC) provided by the manufacturer Contarnex, but it is important to note that they are an illustrative example, and the applicant has not committed to using this specific light, as this choice is normally made at turbine procurement stage.
- The CAA have agreed that low intensity mid tower mast lights would not be required.
- The Proposed Development would also require infra-red lighting, which would not be visible to the human eye. The focus of the night-time visual assessment in this assessment is on the visible lighting requirements of the Proposed Development, and as a result infra-red lighting is not included in the scope of the detailed assessment.
- In accordance with CAA requirements, the lights would be switched on 30 minutes after official sunset and switched off again 30 minutes before sunrise;
- The CAA requires that a secondary light is fitted for use only when the primary light fails, and these would not be lit concurrently; and
- The steady red medium intensity lighting fixed to the top of the nacelles may appear to flicker on and off with blade rotation when the turbine blades pass between the lights and the observer, dependent on wind direction and the position of the observer.

Assumptions, Limitations and Confidence

7.3.44 Photographs and other graphic material such as wirelines and photomontages used in the assessment are for illustrative purposes only and, whilst useful tools in the assessment, are not considered to be completely representative of what will be apparent to the human eye. The assessment itself is carried out from observations in the field and therefore may include elements that are not visible in the photographs.



Zone of Theoretical Visibility (ZTV)

- 7.3.45 There are limitations in the theoretical production of ZTVs, and these should be borne in mind in their consideration and use:
- A Digital Terrain Model (DTM) based on Ordnance Survey Terrain 5 and Terrain 50 has been used to generate the ZTVs within the Study Area. The analysis is based on visibility at points on a 5m and 50m grid and does not take into account local, small-scale landform changes in analysing theoretical visibility;
 - The ZTVs illustrate the 'bare ground' situation, and do not take into account the screening effects of vegetation, buildings, or other local features that may prevent or reduce visibility;
 - The ZTVs do not indicate the reduction in visibility that occurs with increased distance from the Proposed Development. The nature of what is visible from 3km away will differ markedly from what is visible from 10km away, although both are indicated on the ZTVs as having the same level of visibility; and
 - It is important to remember that there is a wide range of variation within the visibility shown on the ZTV. For example, an area shown on the blade tip ZTV as having visibility of all of the turbines may gain views of the smallest extremity of blade tips, or of full turbines. This can make a considerable difference in the effects of the Proposed Development on that area.
- 7.3.46 These limitations mean that while the ZTVs are used as a starting point in the assessment, providing an indication of where the Proposed Development will theoretically be visible and where there would be no visibility, the information drawn from the ZTVs is not completely relied upon to accurately represent visibility of the Proposed Development.

Visualisations

- 7.3.47 Limitations associated with the visualisations are set out in full in **Technical Appendix 7.1** and summarised here.
- 7.3.48 The visualisations are based on theoretical visibility from 1.5m above ground level. There are limitations in these theoretical productions, and these should be borne in mind in the consideration and use of the wireline images. Firstly, the wireline illustrates the 'bare ground' situation, not taking into account the screening effects of vegetation, buildings, or other local features that may prevent or reduce visibility. Secondly, the wireline is based on OS Terrain 5 DTM, so there may be local, small-scale landform variations that are not reflected in the wireline but may alter the actual visibility of the Proposed Development, either by screening theoretical visibility or revealing parts of the Proposed Development that are not theoretically visible. Thirdly, planning conditions are likely to allow the locations of the turbines to be horizontally microsituated to a small degree and the levels of the turbine bases have not yet been established in detail as this will be determined through site investigations and detailed engineering design. Both of these factors may alter the base and therefore the tip heights of the wind turbines above ground level from those that are assumed in the assessment and shown on **Figures 7.17-7.33**. Such variation may also affect ZTVs.
- 7.3.49 Where descriptions within the assessment identify the numbers of wind turbines visible this refers to the theoretical illustrations generated and therefore the reality may differ to a degree from these impressions. These factors are unlikely to make a material difference to the outcome of the assessment.



- 7.3.50 Not all areas of the Study Area are publicly accessible, and this has limited the specific assessment of views from residential and other properties, for example. Notwithstanding these limitations, the assessors consider that there is sufficient information available, from publicly accessible viewpoints, to form a competent assessment of the likely landscape and visual amenity effects.

Embedded Mitigation

- 7.3.51 Embedded mitigation, relevant to the LVIA, relates to site selection and the iterative design of the layout. For this particular proposal, this has primarily involved reducing potential landscape, visual, and residential visual amenity effects by significantly reducing the number of proposed wind turbines (from 15 to 4 relative to the previous planning application on the Site (ref: 12/00515/FUL)), their height, and increasing the separation distances of the wind turbines from residential dwellings. While emphasis has also been placed on designing a relatively small, compact wind farm that does not markedly impact upon the scenic and perceptual qualities of nearby local landscape designations. This has been achieved by ensuring that the wind turbines are set back beyond the threshold of Carron Valley, and appear recessed beyond the containing hills when viewed from the smaller scale landscapes around the Carron Valley Reservoir and River Endrick and River Carron valleys. Additionally, mitigation measures, such as the removal of tower lighting reduces effects. This design mitigation has notably reduced the effects of the Proposed Development on landscape, visual and residential receptors in the Study Area. Further details in relation to the iterative design process area provided in **Chapter 2: Design Evolution and Alternatives**.
- 7.3.52 Residual effects are those effects which remain after mitigation. The residual effects that the Proposed Development will have on landscape and visual receptors are assessed in Sections 7.6-7.8.

7.4 Baseline Conditions

Current Baseline

- 7.4.1 The baseline section of the LVIA records the existing conditions of the 45km Study Area. Establishing a baseline helps to gain an understanding of what makes the landscape distinctive and what its important components or characteristics are. The baseline is instrumental in the identification of the landscape character receptors, visual receptors and viewpoints that are included in the assessment. This section is presented under the following headings:
- Site Context;
 - Landscape Baseline;
 - Visual Baseline;
 - Viewpoints;
 - Cumulative Wind Farm Developments; and
 - Night-time Environment.

Site Context

- 7.4.2 The Site is located approximately 9km south west of Stirling on the southern slopes of Cairnoch Hill (410m AOD), which lies to the north of the Carron Valley Reservoir (see **Figure 7.1**). The slopes of Cairnoch Hill form a containing influence upon a localised depression in the landscape that is centred on the reservoir. The sinuous



and forested slopes provide a strong degree of enclosure around the reservoir, such that there is a perception of a degree of remoteness, which belies its wider surroundings. This is counterbalanced by the man-made reservoir and commercial forestry plantations that provide the prevailing characteristics of the area, as well as the B818 that follows the reservoir's northern shoreline, and the small settlement of Craigannet at the eastern end of the reservoir. Although relatively indiscernible within the landscape, the Carron Valley Forest hosts an array of walking and biking trails that together with the Duncarron Medieval Village attract some visitors.

- 7.4.3 Beyond the immediate landscape of the Carron Valley Reservoir, the Site is surrounded by the Fintry, Gargunnock and Touch Hills to the north west, north, and north east respectively, and the Campsie Fells and Kilsyth Hills to the south west and south east respectively. While the open landscape of the reservoir transitions into the more settled valleys associated with the Endrick Water to the west and the River Carron to the east. The landscape of the Fintry, Gargunnock and Touch Hills comprises open, large-scale moorland that is used for hill grazing with only 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, and Craigengelt and the single wind turbine of Craigannet to the east of the Site. Several smaller reservoirs as well as a number of masts on Earl's Hill are also situated within the Touch and Gargunnock Hills, along with occasional blocks of coniferous forestry. The northernmost hills form part of the setting of the Forth valley. The Campsie Fells and Kilsyth Hills to the south of Carron Valley possess a similar moorland character with occasional blocks of forestry, but there is an absence of wind farm development. These southern hills form part of the setting of the settled lowlands of the Clyde valley. To the west of the Site, the valley associated with the Endrick Water is more settled and hosts the village of Fintry (approximately 6km).
- 7.4.4 Beyond the Kilsyth and Touch Hills lie some strategic transport corridors and some notable settlements. The closest of these strategic roads include the M9, M80 and M876 with sections situated to the east of the Site at distances of over 10km, while at similar distances the M80 also stretches to the south of the Site and connects to the M73. The M9 facilitates access between the cities of Stirling (9.7km) and Edinburgh (47.8km) and passes the towns of Falkirk (15.6km) and Linlithgow (28.6km), amongst others, in the east of the Study Area. The M80 facilitates access between the cities of Stirling (9.7km) and Glasgow (17.2km) and passes the towns of Denny (9.9km) and Cumbernauld (9.6km), amongst others. The corridors associated with these roads are densely settled, and also host sections of the wider railway network. The city of Glasgow forms the largest of these settlements, with the conurbation of Greater Glasgow encompassing a large part of the Study Area at distances of between 16-33km to the south and south west of the Proposed Development. The landscape beyond the Fintry and Gargunnock Hills and Campsie Fells is more rural in nature, but there are a number of locally important roads, such as the A81, A811, A875, and A891, which link some smaller settlements situated at the base of these hill ranges, such as Killearn, Balfron, and Kippen.
- 7.4.5 The more distant landscapes to the west and north west of the Site are characterised by the more rural and scenic LLTNP, located approximately 16km north west of the Site. While the upland landscapes of Perthshire to the north beyond Doune (15.2km), and the Ochil Hills to the north east beyond Stirling, also comprise more rural landscapes. Large parts of these landscapes are subject to national and local landscape designations, which host sections of a number of long distance and tourist routes (see **Figure 7.5**).
- 7.4.6 The closest long-distance routes to the Proposed Development are the Scottish National Trail (approximately 8km), the John Muir Way (approximately 8km) and the Forth & Clyde and Union Canal Towpaths (approx. 8km), which traverse the



landscape at the foot of the Kilsyth Hills. The Forth Valley Tourist Route (approx. 10km) and the Heart 200 (approx. 12km) tourist routes also pass through the wider landscape to the east and north east of the Site respectively.

Landscape Baseline

- 7.4.7 Landscape character information produced by or prepared on behalf of NatureScot forms the basis of the characterisation of the Study Area. In early 2019, NatureScot published an update to the characterisation of Scotland's landscape as a digital resource entitled 'National Landscape Character Assessment Map and Descriptions' (hereafter referred to as 'the NatureScot LCA'). The information builds on the characterisation studies published in the 1990's. NatureScot describe the recent publication as now superseding the 1990s landscape character descriptions and mapping.
- 7.4.8 In relation to the NatureScot LCA, NatureScot (2026)¹ state that *"If there is a relevant sensitivity study, that would take precedence for informing landscape considerations for that development type, e.g. wind farms"*.
- 7.4.9 Stirling Council have published a landscape capacity study ('the SLSCS') which provides analysis in relation to the ability of the landscape to accommodate wind energy development. The most up to date documents that inform the Council's study are listed below:
- Stirling Council. (2019) Supplementary Guidance: Wind Energy Developments; and
 - Stirling Council. (2019) Draft Supplementary Guidance: Landscape Character Assessment.
- 7.4.10 The NatureScot LCA and the SLSCS divide the landscape into areas of distinctive character which are generally referred to as LCTs. The LCTs referred to in the NatureScot LCA that cover the Study Area are shown on **Figure 7.3a** to a 45km radius. While the LCTs identified in the SLSCS are illustrated in **Figure 7.3b**. Many of these LCTs are extensive, sometimes covering several areas that are geographically separate, and the effects of the Proposed Development can vary widely across a single LCT.
- 7.4.11 The SLSCS does not cover the entire Detailed Study Area, and consequently the NatureScot LCA forms the basis of the characterisation of the Study Area where areas are not covered by the SLSCS. The LCTs that are considered in the landscape assessment are illustrated in **Figure 7.3c** and are shown in relation to the blade tip ZTV on **Figure 7.9a-b**.

Landscape Character of the Site

- 7.4.12 The landscape of the Site is defined differently by NatureScot's National Landscape Character Assessment (2019) ('NatureScot's LCA') and the appraisal contained in the SLSCS, as shown on **Figures 7.3a-b**. The Site is defined by NatureScot's LCA as part of a unit of 'Lowland Hills – Central' (149) LCT.
- 7.4.13 The key characteristics of the 'Lowland Hills – Central' LCT according to the NatureScot LCA include its:

¹ www.nature.scot/professional-advice/landscape/landscape-character-assessment/landscape-character-assessment-scotland



- *“Prominent, open, large scale character, of predominantly smooth, gently rounded upper slopes and hill summits.*
- *Simplicity and unity of landform.*
- *Hills covered in rolling expanses of peatland, rough grass and heather moorland.*
- *Occasional, widely scattered blocks of coniferous forest.*
- *Almost entirely uninhabited landscapes, with any dwellings widely dispersed, often located to the edge of single-track roads which zigzag across lower ground.*
- *Recreational use is mainly restricted to the fringes of the hills and higher tops, which provide greater visual interest.*
- *Important close visual interrelationships between the hills and escarpments, and neighbouring lowland and carseland areas.*
- *Open character, absence of current settlement and limited penetration by roads or hill tracks create a refuge of remoteness in close proximity to densely settled areas.*
- *Hills often act as a buffer between more intensively used and populated areas. They create a strong contrast to these areas, and provide a sometimes dramatic backdrop.”*

7.4.14 The SLSCS defines the Site differently as part of the ‘Lowland Hills - Fintry, Gargunnock and Touch Hills’ LCT. The general characteristics of the Lowland Hills - Fintry, Gargunnock and Touch Hills LCT are summarised in the SLSCS:

“At the eastern end of the area (between Carron Bridge and Carron Dam) the valley is relatively narrow and there are no views of the reservoir; but elsewhere the circle of hills creates a natural ‘basin’ landform, which is overlaid with the dominant modern and man-made elements of water supply reservoir and conifer plantations. Localized open areas occur at Craigannet Hill and part of Dundaff Hill, which are given over to improved and rough grazing with tumbledown stone walls and post-and-wire fencing; and to the north-west of the reservoir, where the relatively flat and open ground around Loch Watson and Todholes Farm allows views to the Earlsburn windfarm. There is also an open area of poor rough grassland and heather moorland centred on Meikle Bin. In addition to the softwood forests there are drifts of mixed woodland and trees along the northern edge of the reservoir and a distinctive pattern of shelterbelts on the south-west flank of Dundaff Hill.

This is a landscape undergoing change. Forest harvesting is opening up areas and views hidden for many years and whilst restocking will return many areas to productive woodland, its character and appearance will be somewhat different, with greater age, structural and textural diversity.

Windfarms have been established in adjacent hill areas, are prominent from the surrounding hill peaks and also visible from a few low level locations in the valley.

The B818 traverses the valley from west to east, hugging the north shore of the reservoir and following the River Carron beyond the dam. The combination of accessibility from urban areas, a good network of paths and a sense of relative isolation make this a popular recreational area. Localized impression of neglect, for example: where traditional field boundaries are in poor repair or there are small areas of dereliction associated with former land uses.”



Preliminary Assessment of LCTs

7.4.15 The landscape assessment considers the effect of the Proposed Development on the LCTs within the Site and the surrounding area. The LCTs found in the Study Area are shown on **Figures 7.3a-c**, and together with the ZTV on **Figures 7.9a-b**. LCTs that are predicted to experience theoretical visibility of the Proposed Development are described in **Table 7-3**, along with an initial assessment as to whether they are likely to incur significant landscape effects and, therefore whether they require to be included in the detailed assessment in Section 7.7.

Table 7-3: Preliminary Assessment of LCTs within the Detailed Study Area

Landscape Character Type / Unit	Subject to theoretical visibility?	Needs detailed assessment within LVIA?
3. Forested River Basin - Carron Valley	Yes	Yes - due to the location of the Proposed Development close to the LCT and the extensive areas of theoretical visibility predicted, it is likely that significant effects may arise.
7d. Lowland Hills - Fintry, Gargunnock and Touch Hills	Yes	Yes - due to the location of the Proposed Development in the LCT and the extensive areas of theoretical visibility predicted, it is likely that significant effects may arise.
152. Lowland River Valleys - Central	Yes	No – there is some theoretical visibility predicted along some of the closest sections of the LCT unit near Carron Bridge at distances of approximately 4km. However, these areas are generally enclosed by forestry and as a result there is limited potential for significant effects to arise.
216. Rugged Moorland Hills	Yes	Yes – there are some large areas on the northern slopes of the Campsie Fells and Kilsyth Hills that are predicted to experience theoretical visibility of the Proposed Development at distances as close as 1km from the Proposed Development. As a result, there is potential for significant effects to arise across these closest parts of the LCT unit.
7c. Lowland Hills - Campsie Fells	Yes	Yes - due to the location of the Proposed Development close to the LCT and the large areas of theoretical visibility predicted at distances of over 3km, it is possible that significant effects may arise.
149. Lowland Hills - Central	Yes	Yes – some theoretical visibility predicted across the north-western parts of the LCT at distances of between 4-6km. Although much of these areas are forested, there are some open areas that are susceptible to the effects arising as a result of the Proposed Development.
2. Rolling Valley Farmland - Middle Endrick Water	Yes	Yes - due to the location of the Proposed Development relatively close to the LCT and the areas of theoretical visibility predicted at distances of over 4km, it is possible that significant effects may arise.
150. Lowland Hill Fringes - Central	Yes	No - only very limited theoretical visibility of the Proposed Development in the northern corner of the LCT unit of some blade tips at distances of 6-7km. It is therefore unlikely that significant effects would arise across the LCT unit.
4a. Farmed Valley or Hill Fringe - East Touch Hill Fringe	Yes	No - although there is some theoretical visibility predicted at distances of over 5km, the Proposed Development would be situated beyond the operational Craigengelt Wind Farm.



Landscape Character Type / Unit	Subject to theoretical visibility?	Needs detailed assessment within LVIA?
		It is therefore unlikely that the Proposed Development would significantly affect the character of this LCT unit.
4a. Farmed Valley or Hill Fringe - Gargunnoch Hill Fringe	No	No - due to absence of theoretical visibility across this LCT.
6. Moorland Plateau - Kippen Muir	Yes	No - very limited theoretical visibility predicted across the LCT of a small number of blade tips at distances of over 8km. It is therefore unlikely that the Proposed Development would significantly affect the character of this LCT unit.
205. Broad Valley Lowland - Glasgow & Clyde Valley	No	No - due to absence of theoretical visibility across this LCT.
4a. Farmed Valley or Hill Fringe - Forth/Kippen Muir Valley Fringe	Yes	No - due to absence of theoretical visibility across the majority of this LCT and its distance from the Proposed Development.
1. Flat Valley Floor - Carse West of Stirling	Yes	No - due to relatively limited theoretical visibility on eastern edge of LCT, where landscape possesses an existing influence from the M9 and the outskirts of Stirling, it is unlikely that significant effects would arise.
200. Rolling Farmland - Glasgow & Clyde Valley	Yes	No – very limited theoretical visibility of one to three blade tips (and no hubs) predicted across a small area on the eastern edge and southern edges of the LCT unit at distances of 9km and 15km respectively. These areas are both situated adjacent to the M80 motorway, and this is likely to reduce their susceptibility to distant development. It is therefore unlikely that the Proposed Development would significantly affect the character of this LCT unit.
4a. Farmed Valley or Hill Fringe - Sauchenford/Castleton Valley Fringe	Yes	No - relatively widespread theoretical visibility of the Proposed Development predicted at distances greater than 10km. However, the wind turbines would be situated beyond the operational Craigengelt Wind Farm, and often visible in the broader context of the nearby M80 and M9 roads.
211. Drumlin Foothills	Yes	No – some minor theoretical visibility of one blade tip (and no hubs) predicted around Milngavie at distances of approximately 19km from the Proposed Development. It is therefore unlikely that the Proposed Development would significantly affect the character of this LCT unit.
151. Lowland Plateaux - Central	Yes	No - some relatively widespread theoretical visibility of the Proposed Development across the LCT unit of varying numbers of turbines, including blades and turbine hubs, at distances of between 11-20km. The wind turbines would be situated beyond the settled Kelvin Valley and would be visible in the context of the operational Earlsburn and Craigengelt Wind Farms. The wind turbines would therefore not introduce a new characteristic influence on the setting of the LCT unit, and it is unlikely that significant effects would arise.



Landscape Character Type / Unit	Subject to theoretical visibility?	Needs detailed assessment within LVIA?
2. Rolling Valley Farmland - Garden/Gartinstarry	Yes	No - very limited theoretical visibility predicted across the eastern edge of the LCT of a small number of blade tips at distances of over 12km. It is therefore unlikely that the Proposed Development would significantly affect the character of this LCT unit.
4b. Farmed Valley or Hill Fringe - Forth/Teith Valley Fringe	Yes	No - very limited theoretical visibility predicted across the northern edge of the LCT of a small number of blade tips at distances of over 17km. It is therefore unlikely that the Proposed Development would significantly affect the character of this LCT unit.
1. Flat Valley Floor - Carse East of Stirling	Yes	No - widespread theoretical visibility predicted across the majority of the LCT of a small number of wind turbines at distances of over 12km. However, the wind turbines would be partially situated beyond the operational Craigengelt Wind Farm, and often visible in the broader context of the closer settlement of Stirling and M80 and M9 roads. It is therefore unlikely that the Proposed Development would significantly affect the character of this LCT unit.
201. Plateau Farmland - Glasgow & Clyde Valley	Yes	No - some relatively widespread theoretical visibility of the Proposed Development across the LCT unit of varying numbers of wind turbines, including blades and wind turbine hubs, at distances of between 12-20km. The wind turbines would be situated beyond the settled Kelvin Valley, including the settlement of Cumbernauld, and would be visible in the context of the operational Earlsburn and Craigengelt Wind Farms. The wind turbines would therefore not introduce a new characteristic influence on the setting of the LCT unit, and it is unlikely that significant effects would arise.
2. Rolling Valley Farmland - Strath Blane	No	No - due to absence of theoretical visibility across this LCT.
1. Flat Valley Floor - Flanders Moss West	Yes	No - very limited theoretical visibility predicted of a small proportion of one or three turbines at distances of over 13km across the north eastern edge of the LCT. The turbines would be situated beyond the operational Earlsburn North Wind Farm and as a result there is an existing characteristic influence from this part of the LCT's setting. It is therefore unlikely that the Proposed Development would significantly affect the character of this LCT unit.
2. Rolling Valley Farmland - Teith Valley	Yes	No - very limited theoretical visibility predicted across the north-western edge of the LCT of one blade tip at distances of over 18km. It is therefore unlikely that the Proposed Development would significantly affect the character of this LCT unit.
5. Moorland Hill Fringe - Mugdock	Yes	No - very limited theoretical visibility predicted across the south east of the LCT of one blade tip at distances of over 15km. It is therefore unlikely that the Proposed Development would significantly affect the character of this LCT unit.



Landscape Character Type / Unit	Subject to theoretical visibility?	Needs detailed assessment within LVIA?
2. Rolling Valley Farmland - Lower Endrick Water	Yes	Yes - some widespread theoretical visibility of the Proposed Development, including turbine hubs, is predicted between Balforn and Drymen at distances of between 13-19km, and as a result it is possible that significant effects may arise.
213. Plateau Moorlands - Glasgow & Clyde Valley	Yes	No - some relatively widespread theoretical visibility of the Proposed Development across the LCT unit of varying numbers of turbines, including blades and turbine hubs, at distances of between 13-20km. The wind turbines would be situated beyond the settled Kelvin Valley, including the settlement of Cumbernauld, and would be visible in the context of the operational Earlsburn and Craigengelt Wind Farms. The wind turbines would therefore not introduce a new characteristic influence on the setting of the LCT unit, and it is unlikely that significant effects would arise.
203. Urban Fringe Farmland	Yes	No - some relatively widespread theoretical visibility of the Proposed Development across the LCT unit of one or two turbines blade tips at distances of between 14-20km. The wind turbines would be situated beyond the settled Kelvin Valley, including the settlements of Cumbernauld and Kirkintilloch, and would be visible in the context of the operational Earlsburn and Craigengelt Wind Farms. The wind turbines would therefore not introduce a new characteristic influence on the setting of the LCT unit, and it is unlikely that significant effects would arise.
4a. Farmed Valley or Hill Fringe - Forth/Teith/Allan Valley Fringe	Yes	No – some theoretical visibility of one or two blade tips and no hubs at distances of between 14-17km. A large proportion of these areas coincide with the M9 route, which is likely to reduce the susceptibility of the landscape to development, and the wind turbines where visible would be apparent within the context of the operational Earlsburn wind farms. It is therefore unlikely that the Proposed Development would significantly affect the character of this LCT unit.
2. Rolling Valley Farmland - Dykehead	Yes	No – some theoretical visibility of between 1-3 wind turbine blade tips at distances of 14-17km from the Proposed Development. The turbines would be situated beyond the operational Earlsburn North Wind Farm and as a result there is an existing characteristic influence from this part of the LCT's setting. It is therefore unlikely that the Proposed Development would significantly affect the character of this LCT unit.
4a. Farmed Valley or Hill Fringe - West Ochil Hill Fringe	Yes	No - widespread theoretical visibility predicted across the majority of the LCT of up to three wind turbines, including some hubs, at distances of 13-18km. However, the wind turbines would be partially situated beyond the operational Craigengelt Wind Farm, and often visible in the broader context of the closer settlement of Stirling and M9 road. It is therefore unlikely that the Proposed Development would significantly affect the character of this LCT unit.
153. Carselands	Yes	No - widespread theoretical visibility predicted across the majority of the LCT of the wind turbines at distances of over 14km. However, the wind turbines would be situated beyond the operational Craigengelt Wind Farm, and often



Landscape Character Type / Unit	Subject to theoretical visibility?	Needs detailed assessment within LVIA?
		visible in the broader context of the closer settlement situated across the carse and M80, M8 and M9 roads. It is therefore unlikely that the Proposed Development would significantly affect the character of this LCT unit.
259. Rolling Farmland and Estates - Loch Lomond & the Trossachs	Yes	No – a small area of theoretical visibility of between 1-3 wind turbine blade tips at a distance of over 18km. The wind turbines would be situated beyond the operational Earlsburn North Wind Farm, which would moderate effects on the LCT unit. It is therefore unlikely that the Proposed Development would significantly affect the character of this LCT unit.
7a. Lowland Hills - Ochil Hills	Yes	No - widespread theoretical visibility predicted across the majority of the LCT of up to three wind turbines, including three hubs, at distances of 16-20km. However, the wind turbines would be partially situated beyond the operational Craigengelt Wind Farm, and often visible in the broader context of the closer settlement of Stirling and M9 road. It is therefore unlikely that the Proposed Development would significantly affect the character of this LCT unit.
262. Lowland Peatland and Loch Basin	Yes	No – some widespread areas of theoretical visibility of between 1-3 turbine blade tips, and occasionally some hubs, at a distance of over 16km. The wind turbines would be situated beyond the operational Earlsburn North Wind Farm, which would moderate effects on the LCT unit. It is therefore unlikely that the Proposed Development would significantly affect the character of this LCT unit.
5. Moorland Hill Fringe - Cameron Muir & Stockie Muir	No	No - due to absence of theoretical visibility across this LCT.
5. Moorland Hill Fringe - Braes of Doune	Yes	No – some theoretical visibility of between 1-3 wind turbine blade tips at distances of 16-20km from the Proposed Development. The turbines would be situated in the context of the operational Earlsburn wind farms and as a result there is an existing characteristic influence from this part of the LCT's setting. It is therefore unlikely that the Proposed Development would significantly affect the character of this LCT unit.
5. Moorland Hill Fringe - Bat a' Charchel	Yes	No - some theoretical visibility of the Proposed Development across approximately half of the LCT unit, including turbine hubs, is predicted around Garadhban Forest at distances of between 16-20km. However, given the relatively small extent of the proposal, it is unlikely that significant effects would arise across these parts of the LCT unit at these distances.
2. Rolling Valley Farmland - Allan Water	Yes	No - widespread theoretical visibility predicted across the majority of the LCT of up to three wind turbines blade tips (and no hubs) at distances of 18-20km. However, the wind turbines would be partially situated beyond the operational Craigengelt Wind Farm, and often visible in the broader context of the closer settlement of Dunblane and the M9 road. It is therefore unlikely that the Proposed Development would significantly affect the character of this LCT unit.



Landscape Character Type / Unit	Subject to theoretical visibility?	Needs detailed assessment within LVIA?
5. Moorland Hill Fringe - Sheriff Muir	Yes	No - widespread theoretical visibility predicted across the majority of the LCT of up to three wind turbines, including three hubs, at distances of 17-20km. However, the wind turbines would be situated in the context of the operational Earlsburn and Craigengelt wind farms, and often visible in the broader context of the closer settlement of Stirling and M9 road. It is therefore unlikely that the Proposed Development would significantly affect the character of this LCT unit.
258. Ridges and Knolls with Estates	Yes	No – some areas of theoretical visibility of between 1-3 wind turbine blade tips, and occasionally some hubs, at a distance of over 19km. The wind turbines would be situated in the context of the operational Earlsburn North Wind Farm, which would moderate effects on the LCT unit. It is therefore unlikely that the Proposed Development would significantly affect the character of this LCT unit.
257. Plateau Moor and Forest - Loch Lomond & the Trossachs	Yes	No – some small areas of theoretical visibility of between 1-4 wind turbine blade tips and hubs at a distance of over 19km. The Proposed Development would introduce a new characteristic influence but at this range, it is unlikely that it would significantly affect the character of this LCT unit.
260. River Valley Farmland and Estates	Yes	No – some small areas of theoretical visibility of between 1-4 wind turbine blade tips and hubs at a distance of over 19km. The Proposed Development would introduce a new characteristic influence but at this range, it is unlikely that it would significantly affect the character of this LCT unit.
255. Parallel Ridges - Loch Lomond & the Trossachs	Yes	No – some small areas of theoretical visibility of between 1-4 wind turbine blade tips and hubs at a distance of over 19km. The Proposed Development would introduce a new characteristic influence but at this range, it is unlikely that it would significantly affect the character of this LCT unit.
253. Straths and Glens	No	No - due to absence of theoretical visibility across this LCT.

7.4.16 **Table 7-3** indicates that the following LCTs have potential to be significantly affected by the Proposed Development:

- 3. Forested River Basin - Carron Valley;
- 7d. Lowland Hills - Fintry, Gargunnock and Touch Hills;
- 216. Rugged Moorland Hills;
- 7c. Lowland Hills - Campsie Fells;
- 149. Lowland Hills – Central;
- 2. Rolling Valley Farmland - Middle Endrick Water; and
- 2. Rolling Valley Farmland - Lower Endrick Water.

Landscape Planning Designations

7.4.17 There are three ways in which landscape planning designations are relevant to the LVIA:



- The presence of a designation can give an indication of a recognised value that may increase the sensitivity of a landscape character receptor, viewpoint or visual receptor, and may therefore affect the significance of the effect on that receptor;
- The presence of a relevant designation can lead to the selection of a representative viewpoint within the designated area, as the viewpoint will provide a representative outlook from that area; and
- Designated areas may be included as landscape character receptors so that the effects of the Proposed Development on these features of the landscape that have been accorded particular value can be specifically assessed.

7.4.18 The Site itself is located within a local landscape designation, the Southern Hills LLA, which is afforded protection in relation to its landscape quality and/ or scenery. Various other nationally and locally designated areas are found elsewhere in the Study Area and these are shown on **Figure 7.4** and in conjunction with the blade tip ZTV on **Figure 7.10a-b**.

7.4.19 Through the EIA Scoping process, it was indicated that the effects on a number of landscape planning designations could be discounted from the LVIA assessment as it is considered unlikely that the effects would be significant. In light of amendments to the Proposed Development, and also additional fieldwork undertaken by the author, a subsequent review of the current Proposed Development has been undertaken to identify whether the conclusions of the preliminary assessment remain relevant.

National Parks and National Scenic Areas

7.4.20 National Parks (NPs) and National Scenic Areas (NSAs) are areas of land considered to be important on a national level and are designated by NatureScot. Policy 4 (Natural Places) of National Planning Framework 4 (NPF4) (Scottish Government, 2023) states that:

“(c)Development proposals that will affect a National Park, National Scenic Area, Site of Special Scientific Interest or a National Nature Reserve will only be supported where:

i. The objectives of designation and the overall integrity of the areas will not be compromised; or

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

7.4.21 National landscape designations within or partially within the 45km Study Area are shown on **Figure 7.4**. The ZTVs on **Figure 7.10a** and **7.10b** show the limited extent of theoretical visibility across many of these designated areas.

7.4.22 LLTTNP is the only NP in the Study Area. During consultation with NatureScot (see Section 7.2) it was agreed that a detailed assessment of the effects of the Proposed Development on the LLTTNP is not required due to the limited extent of visibility predicted (shown on **Figure 7.10a**), its distance of over 16km from the Proposed Development, and the location of the Proposed Development within a part of the setting that already contains an influence from other operational wind farm development.

7.4.23 There are three NSAs in the 45km Study Area: Loch Lomond (21km), The Trossachs (21km), and River Earn (Comrie to St Fillans) (34km). It is considered



that a detailed assessment of the effects of the Proposed Development on these NSAs is also not required due to the limited extent of visibility predicted (shown on **Figure 7.10a**), their distances from the Proposed Development, and the location of the Proposed Development within a part of their setting that already contains an influence from other operational wind farm development.

- 7.4.24 In summary, no significant effects would arise upon the special qualities of any NPs or NSAs as a result of the introduction of the Proposed Development.

Gardens and Designed Landscapes

- 7.4.25 Historic Environment Scotland (HES) is responsible for designating Gardens and Designed Landscapes (GDLs). These are contained in an Inventory which can be accessed at <https://www.historicenvironment.scot/>. The descriptions contained in the Inventory identify each GDL's qualifying features which are of national importance.

- 7.4.26 The protection which historic assets, including GDLs, are afforded is described in Policy 7 of NPF4:

“(i) Development proposals affecting nationally important Gardens and Designed Landscapes will be supported where they protect, preserve or enhance their cultural significance, character and integrity and where proposals will not significantly impact on important views to, from and within the site, or its setting.”

- 7.4.27 There are 66 GDLs in the 45km Study Area as shown on **Figure 7.4**. Through the request for a Scoping Opinion, it was agreed that all of these GDLs would be discounted from the detailed assessment in the LVIA owing to a combination of limited visibility and separation distances.

Local/ Special Landscape Areas

- 7.4.28 A LLA or Special Landscape Area (SLA) is an area of landscape considered to be important on a local level and are designated by Councils. Policy 4 of NPF4 (Scottish Government, 2023) states that:

“(d) Development proposals that affect a site designated as a local nature conservation site or landscape area in the LDP will only be supported where:

i. Development will not have significant adverse effects on the integrity of the area or the qualities for which it has been identified; or

ii. Any significant adverse effects on the integrity of the area are clearly outweighed by social, environmental or economic benefits of at least local importance.”

- 7.4.29 Local landscape designations within or partially within the 45km Study Area are shown on **Figure 7.4**. The ZTVs on **Figures 7.10a-b** show the limited extent of theoretical visibility across many of these designated areas.

- 7.4.30 Through the request for a Scoping Opinion, it was agreed that the detailed assessment of the effects of the Proposed Development in the LVIA would be limited to the Southern Hills LLA (0km), Kilsyth Hills SLA (1km), Denny Hills SLA (3km), and Campsie Fells LLA (3km). All other local landscape designations located within the Study Area were discounted from the detailed assessment in the LVIA due to a combination of absence or limited theoretical visibility and their distance from the Proposed Development.

- 7.4.31 The SLQs of these designations have been derived from the following documents:



- Stirling Council (2019). Draft Supplementary Guidance. Landscape Character Assessment. Appendix: Citations²;
- North Lanarkshire Council (2018). North Lanarkshire Local Development Plan Modified Proposed Plan. Statement of Landscape Importance for the Kilsyth Hills Special Landscape Area Background Report³;
- Falkirk Council (2021). SG09 Landscape Character Assessment and Landscape Designations. Appendix 2 - Special Landscape Areas (formerly Areas of Great Landscape Value) Statements of Importance and Descriptions⁴; and
- East Dunbartonshire Council (2018). Natural Environment Planning Guidance⁵.

Wild Land

- 7.4.32 Wild Land Areas (WLA) mapped by NatureScot encompass Scotland's most extensive areas of high wilderness. Policy 4 of NPF4 (Scottish Government, 2023) outlines criteria that needs to be satisfied by development proposals in WLAs:

“(g) Development proposals in areas identified as wild land in the Nature Scot Wild Land Areas map will only be supported where the proposal:

- i. will support meeting renewable energy targets; or,*
- ii. is for small scale development directly linked to a rural business or croft, or is required to support a fragile community in a rural area.*

All such proposals must be accompanied by a wild land impact assessment which sets out how design, siting, or other mitigation measures have been and will be used to minimise significant impacts on the qualities of the wild land, as well as any management and monitoring arrangements where appropriate. Buffer zones around wild land will not be applied, and effects of development outwith wild land areas will not be a significant consideration.”

- 7.4.33 There are two WLAs located within the 45km Study Area, which are shown on **Figure 7.4**. WLA 07: Ben More – Ben Ledi is situated approximately 24km to the north-west of the Proposed Development, and WLA 04: Waterhead Moor – Muirshiel is situated approximately 44km to the south-west. Through the request for a Scoping Opinion, it was agreed that these WLAs would be discounted from the LVIA owing to a combination of the limited visibility predicted, the large separation distance from the Proposed Development, and intervening development between the Proposed Development and the WLAs.

Visual Baseline

- 7.4.34 A number of visual receptors such as settlements and travel routes are considered in the assessment as views from them may be affected by the Proposed Development. It is not possible to consider every potential visual receptor in the Study Area due to the extent of ground that it covers, and the assessment therefore concentrates on the key visual receptors that may gain visibility of the Proposed

² www.stirling.gov.uk/media/pgxkltlw/lca-nov-2019-rfs.pdf

³ www.northlanarkshire.gov.uk/sites/default/files/2020-10/Special%20Landscape%20Importance%20Kilsyth%20Hills.pdf

⁴ <https://coins.falkirk.gov.uk/viewSelectedDocument.asp?c=e%97%9Dc%8Fm%82%8E>

⁵ www.eastdunbarton.gov.uk/media/dgggnns12/natural-environment.pdf



Development, such as settlements and routes. Principal visual receptors are shown on **Figure 7.5** and in conjunction with the blade tip ZTV on **Figures 7.11a-b**.

Settlements and Residents

- 7.4.35 The settlements and residents most likely to be affected by the Proposed Development are those that are shown on the ZTVs to gain higher levels of visibility and generally lie in relatively close proximity. The closest residents that are subject to theoretical visibility of the Proposed Development are located along the minor roads in the local area, but there are also some more distant settlements that may receive visibility of the proposed wind turbines. Residential properties situated within 2km of the proposed wind turbines are included in the Residential Visual Amenity Assessment (RVAA) in **Technical Appendix 7.2**.
- 7.4.36 A preliminary assessment of settlements that require detailed assessment in the LVIA is provided in **Table 7-4**.

Table 7-4: Preliminary Assessment of Settlements within the Detailed Study Area

Settlement	Distance (km)	Needs detailed assessment within LVIA?
Kilsyth	6.4	No - due to absence of theoretical visibility across the settlement.
Fintry	6.8	Yes – due partial theoretical visibility across southern parts of the settlement and distance from the Proposed Development.
Queenzieburn	7.5	No - due to absence of theoretical visibility across the settlement.
Gargunnock	8.3	No - due to absence of theoretical visibility across the settlement.
Banknock	8.6	No - due to absence of theoretical visibility across the settlement.
Dullatur	8.9	No - due to absence of theoretical visibility across the settlement.
Kippen	9.1	No - due to absence of theoretical visibility across the settlement.
Croy (North Lanarkshire)	9.1	No - due to absence of theoretical visibility across the settlement.
Lennoxton	9.3	No - due to absence of theoretical visibility across the settlement.
Milton of Campsie	9.3	No - due to absence of theoretical visibility across the settlement.
Cumbernauld	9.5	No – due to limited theoretical visibility across the north eastern and south western edges of the settlement, and the likely presence of intervening screening from either buildings and woodland.
Dunipace	9.5	No - due to absence of theoretical visibility across the settlement.
Cambusbarron	9.6	No - due to absence of theoretical visibility across the settlement.
Stirling	9.8	No – due to the relatively limited theoretical visibility of blade tips predicted at distances of over 10km, in the



Settlement	Distance (km)	Needs detailed assessment within LVIA?
		same section of views as the closer operational Craigengelt wind turbines.
Denny	9.9	No – due to the relatively limited theoretical visibility of blade tips predicted at distances of over 10km, in the broader context of the closer operational Craigengelt wind turbines.
Kirkintilloch	10.7	No - due to absence of theoretical visibility across the settlement.
Bannockburn	11.0	No – due to the relatively limited theoretical visibility of blade tips predicted at distances of over 11km, in the same section of views as the closer operational Craigengelt wind turbines.
Dennyloanhead	11.0	No - due to absence of theoretical visibility across the settlement.
Bonnybridge	11.6	No – due to very limited theoretical visibility across the settlement.
Plean	12.2	No – due to very limited theoretical visibility across the settlement.
Torrance	12.8	No - due to absence of theoretical visibility across the settlement.
Cowie	13.1	No – due to the relatively limited theoretical visibility of blade tips predicted at distances of over 13km, in the same section of views as the closer operational Craigengelt wind turbines.
Balfron	13.3	Yes – due to widespread theoretical visibility across the settlement and the absence of intervening development.
Buchlyvie	13.4	No - due to absence of theoretical visibility across the settlement.
Strathblane	13.4	No - due to absence of theoretical visibility across the settlement.
Moodiesburn	13.5	No – due to very limited theoretical visibility across the settlement.
Bridge of Allan	13.6	No – due to the relatively limited theoretical visibility of blade tips predicted at distances of over 13km, in the same section of views as the operational Craigengelt, Earlsburn and Earlsburn North wind turbines.
Thornhill (Stirling)	13.8	No - due to absence of theoretical visibility across the settlement.
Larbert and Stenhousemuir	13.9	No – due to the location of the Proposed Development in the same section of views as the operational Craigengelt, Earlsburn and Earlsburn North wind turbines, but also beyond the closer operational Tod Hill wind turbines.
Fallin	13.9	No – due to the distance from the Proposed Development, and the location of the Proposed Development in the same section of views as the closer operational Craigengelt wind turbines.



Settlement	Distance (km)	Needs detailed assessment within LVIA?
Bishopbriggs	14.6	No - due to absence of theoretical visibility across the settlement.
Chryston	14.9	No – due to very limited theoretical visibility across the settlement and distance from the Proposed Development.
Auchinloch	14.9	No - due to absence of theoretical visibility across the settlement.
Camelon	15.4	No – due to the location of the Proposed Development in a similar context as the operational Craigengelt, Earlsburn and Earlsburn North wind turbines at distances of over 15km, but also beyond the closer operational Tod Hill wind turbines.
Throsk	15.5	No – due to the distance from the Proposed Development, and the location of the Proposed Development in the same section of views as the closer operational Craigengelt wind turbines.
Tullibody	15.5	No – due to the distance from the Proposed Development, and the location of the Proposed Development in the same section of views as the closer operational Craigengelt wind turbines.
Killearn	15.6	No - due to absence of theoretical visibility across the settlement.
Falkirk	15.6	No – due to the location of the Proposed Development in a similar context as the operational Craigengelt, Earlsburn and Earlsburn North wind turbines at distances of over 15km, but also beyond the closer operational Tod Hill wind turbines.
Deanston	15.6	No - due to absence of theoretical visibility across the settlement.
Doune	15.8	No - due to absence of theoretical visibility across the settlement.
Glenboig	16.1	No – due to very limited theoretical visibility of blade tips across the settlement and distance from the Proposed Development.
Gartcosh	16.2	No – due to very limited theoretical visibility of blade tips across the settlement and distance from the Proposed Development.
Milngavie	16.3	No - due to absence of theoretical visibility across the settlement.
Stepps	16.4	No – due to very limited theoretical visibility of blade tips across the settlement and distance from the Proposed Development.
Wattston	16.5	No – due to very limited theoretical visibility of blade tips across the settlement and distance from the Proposed Development.
Dunblane	16.5	No – due to very limited theoretical visibility of blade tips across the settlement and distance from the Proposed Development.



Settlement	Distance (km)	Needs detailed assessment within LVIA?
Glenmavis	16.8	No – due to very limited theoretical visibility across the settlement and distance from the Proposed Development.
Glasgow	16.9	No – due to limited theoretical visibility across the settlement and distance from the Proposed Development.
Menstrie	17.8	No – due to the distance from the Proposed Development, and the location of the Proposed Development in the same section of views as the closer operational Craigengelt wind turbines.
Bearsden	17.8	No - due to absence of theoretical visibility across the settlement.
Alloa	17.9	No – due to the distance from the Proposed Development, and the location of the Proposed Development in the same section of views as the closer operational Craigengelt wind turbines.
Coatbridge	18.3	No – due to theoretical visibility of blade tips across the settlement only and distance from the Proposed Development.
Slamannan	18.7	No – due to the distance from the Proposed Development, and the location of the Proposed Development in the same section of views as the operational Craigengelt, Earlsburn and Earlsburn North wind turbines.
Airdrie	18.7	No – due to very limited theoretical visibility across the settlement and distance from the Proposed Development.
Airth	18.9	No – due to very limited theoretical visibility across the settlement and distance from the Proposed Development.
Hallglen	19.0	No – due to the location of the Proposed Development in a similar context as the operational Craigengelt, Earlsburn and Earlsburn North wind turbines at distances of over 19km.
Plains	19.6	No – due to very limited theoretical visibility across the settlement and distance from the Proposed Development.

7.4.37 **Table 7-4** indicates that the following settlements have potential to be significantly affected by the Proposed Development:

- Fintry; and
- Balfron.

Roads (inc. Scenic Routes)

7.4.38 It is not possible, or necessary, to assess the potential effects of the Proposed Development on every route. However, some of the key routes require consideration in the assessment. Four principal criteria have been used in determining the inclusion of routes in the assessment:



- The extent to which the route traverses the Study Area or extends across a notable part of it;
- The importance of the route in terms of recognition, signage, traffic volume and usage;
- The extent of theoretical visibility of the Proposed Development from the route; and
- The potential for cumulative effects along the route.

7.4.39 The location and extent of roads in the Study Area reflects the topography, with the majority of roads following the paths of river valleys, beneath more elevated landforms, or across the more open carselands. Of relevance to this LVIA are the B818 and the B822 (see **Figure 7.11a**), which have sections within 20km of the Proposed Development where there is potential for significant effects to arise. None of the relevant sections of these roads constitute part of the tourist routes highlighted in **Figure 7.5**, and consequently these tourist routes are discounted from further assessment. The effects of the Proposed Development on each of these roads is considered in the detailed assessment.

7.4.40 Significant effects are unlikely to occur along other roads across the Study Area, including the M80, M9, M73, M876, A811, A81, and A875 due to either an absence or very limited distant theoretical visibility, the Proposed Development's situation either beyond the nearby operational Craigengelt Wind Farm or within the broader context of the operational Earlsburn and Earlsburn North Wind Farms, and/ or extensive intervening woodland screening. These other roads have therefore been scoped out of the assessment, and they are therefore not assessed in any further detail.

Railways

7.4.41 There are a large number of railway lines in the Study Area, in particular to the south of the Proposed Development in and around the city of Glasgow. National routes include the Glasgow to Perth line and the Glasgow to Edinburgh line, which pass to the south and east of the Site. Within the Detailed Study Area, these routes pass through the Kelvin valley and wider Glasgow area, as well as the carse and valley and hill fringes between Falkirk and Stirling. Theoretical visibility of wind turbine blade tips is experienced along the Glasgow-Edinburgh line and Glasgow-Perth line at distances of greater than 11km and 13km respectively, with these distances increasing to 15km for both lines in relation to theoretical visibility of wind turbine hubs. Overall, significant effects are unlikely to occur along these railway lines due to either an absence or distant theoretical visibility, which is often limited to blade tips, along the closest sections, the Proposed Development's situation either beyond the nearby operational Craigengelt Wind Farm or within the broader context of the operational Earlsburn and Earlsburn North Wind Farms, and the often settled context from which these views are experienced from. Railway lines are therefore discounted from the detailed assessment of the LVIA at this stage and are not assessed in any further detail.

Cycling Routes

7.4.42 There are six cycle routes in the Detailed Study Area: National Cycle Routes (NCR) 7, 76, 754, 755, 765, and 767. Of these routes, there is no theoretical visibility predicted along NCR755. The location and extent of theoretical visibility predicted reflects a similar pattern to other routes in the Detailed Study Area. In relation to NCR7 which passes through the west of the Study Area, some theoretical visibility of a single blade tip (and no hubs) is predicted near Gartness at distances of



approximately 19-20km from the Proposed Development, and it is therefore considered that walkers are unlikely to experience significant effects along this section of the route. The remaining potentially affected sections of NCR76, 754, 765, and 767 are situated across eastern and north eastern parts of the Detailed Study Area, to the east of the M80 corridor. Theoretical visibility of the Proposed Development is predicted at distances of between 12-20km along sections of these routes in the broader vicinity of the settlements of Falkirk, Stenhousemuir, Bannockburn, Stirling, Bridge of Allan, and Dunblane, as well as the carselands that connect these settlements. Given the extensive development that is present close to these potentially affected sections of the routes, the relatively limited extent of the Proposed Development that would be visible, and the position of the Proposed Development in a section of views that contains the operational Craigengelt and Earlsburn Wind Farms, it is unlikely that significant effects would be experienced by recreational walkers along potentially affected sections of these routes. Consequently, cycling routes are scoped out of further detailed assessment in the LVIA.

Walking Routes

- 7.4.43 There are sections of 11 recognised long distance walking routes located in the Study Area. Of these 11 routes, there are only four routes that are predicted to experience some theoretical visibility within the Detailed Study Area: the West Highland Way, the John Muir Way, Scottish National Trail, and the Forth & Clyde and Union Canal Towpaths. In relation to the West Highland Way, there is some theoretical visibility of a single blade tip (and no hubs) near Gartness at distances of approximately 19-20km from the Proposed Development, and it is therefore considered that walkers are unlikely to experience significant effects along this section of the route. The John Muir Way, Scottish National Trail, and the Forth & Clyde and Union Canal Towpaths are all predicted to experience theoretical visibility of the Proposed Development at distances of between 13-20km along sections of these routes to the south-east of Bonnybridge and to the south of Falkirk. Theoretical visibility tends to increase with distance and from within the more concentrated areas of settlement around Falkirk. Given the extensive development that is present close to these potentially affected sections of the routes, the relatively limited extent of the Proposed Development that would be visible, and the position of the Proposed Development in a section of views that contains the operational Craigengelt and Earlsburn Wind Farms, it is unlikely that significant effects would be experienced by recreational walkers along potentially affected sections of these routes. Consequently, long distance routes are scoped out of further detailed assessment in the LVIA.
- 7.4.44 There are a large number of core paths in the Study Area (shown on **Figure 7.5**, and in conjunction with the ZTV on **Figure 7.11b**), as designated by the various local authorities. These are not all individually considered in the assessment due to the number of routes and the limited relevance of the majority of these to the Proposed Development. However, where there is potential for significant effects on views to arise, core paths that are located within 5km of the Proposed Development are considered in the detailed assessment. A preliminary assessment of these core paths is provided in **Table 7-5**.

Table 7-5: Preliminary Assessment of Core Paths

Code	Local Authority	Comments
9078	Stirling	Extensive theoretical visibility is predicted along the majority of the length of this core path at distances of between



Code	Local Authority	Comments
		approximately 1-5km from the Proposed Development. A detailed assessment of effects upon this core path is provided in Section 7.8.
NL/1/1	North Lanarkshire	Extensive theoretical visibility is predicted along the majority of the length of this core path at distances of approximately 2km from the Proposed Development. A detailed assessment of effects upon this core path is provided in Section 7.8.
NL/10/1	North Lanarkshire	Extensive theoretical visibility is predicted along the majority of the length of this core path at distances of approximately 5km from the Proposed Development. A detailed assessment of effects upon this core path is provided in Section 7.8.
NL/2/1	North Lanarkshire	Extensive theoretical visibility is predicted along the majority of the length of this core path at distances of between approximately 2-5km from the Proposed Development. However, the route is contained within an area of commercial conifer forestry and consequently it is expected that this would provide a strong degree of enclosure to recreational walkers. A detailed assessment of effects upon this core path is not provided in the detailed assessment.
NL/3/1	North Lanarkshire	Extensive theoretical visibility is predicted along the majority of the length of this core path at distances of approximately 2km from the Proposed Development. However, the route is contained within an area of commercial conifer forestry and consequently it is expected that this would provide a strong degree of enclosure to recreational walkers. A detailed assessment of effects upon this core path is not provided in the detailed assessment.
NL/6/1	North Lanarkshire	Extensive theoretical visibility is predicted along the majority of the length of this core path at distances of between approximately 4-5km from the Proposed Development. A detailed assessment of effects upon this core path is provided in Section 7.8.
NL/7/1	North Lanarkshire	Some theoretical visibility is predicted along part of the length of this core path at distances of between approximately 4-5km from the Proposed Development. A detailed assessment of effects upon this core path is provided in Section 7.8.
NL/8/1	North Lanarkshire	Very limited theoretical visibility is predicted along the length of this core path at distances of approximately 4km from the Proposed Development. A detailed assessment of effects upon this core path is not provided in the detailed assessment.
NL/9/1	North Lanarkshire	No theoretical visibility is predicted along the length of this core path. A detailed assessment of effects upon this core path is not provided in the detailed assessment.



7.4.45 **Table 7-5** indicates that the receptors on the routes of the following core paths have potential to be significantly affected by the Proposed Development:

- 9078;
- NL/1/1;
- NL/10/1;
- NL/6/1; and
- NL/7/1.

Historic Landmarks

7.4.46 In their Scoping Opinion, Stirling Council highlighted the potential for effects to be experienced from some notable historic landmarks, including The Wallace Monument, Stirling Castle, The Bannockburn Memorial and Battlefield, and Sheriffmuir Battlefield. While the Cultural Heritage Chapter of the EIA Report considers the effects of the Proposed Development on the setting of these cultural heritage features, the LVIA focusses on the potential visual effects that could be experienced by people visiting these attractions.

7.4.47 Visualisations have therefore been produced to illustrate the effects of the Proposed Development from The Wallace Monument (Viewpoint 14) and Stirling Castle (Viewpoint 13), and the visual effects that would be experienced from these two locations are considered further in relation to these viewpoints in the following section. However, there is no theoretical visibility of the Proposed Development predicted at the Bannockburn Memorial and the Battle of Bannockburn Visitor Centre, and as a consequence it is not considered any further in the LVIA.

7.4.48 In relation to the Sheriffmuir Battlefield and the Clan MacRae Monument (19.8km), there is some distant theoretical visibility of the Proposed Development. In views, the Proposed Development would form a relatively indiscernible addition to the baseline view due to its situation within the context of the operational Craigengelt Wind Farm. Landform screening would also reduce the perceived scale of the wind turbines, and as a consequence it is considered that there isn't potential for significant visual effects to arise at these locations. As a consequence, the Sheriffmuir Battlefield is not considered in further detail in the LVIA.

Viewpoints

7.4.49 The assessment of landscape and visual effects is informed by a series of viewpoints, which are selected to represent visibility from landscape character types, landscape planning designations and principal visual receptors around the Study Area. These include points of specific importance such as recognised viewpoints, designated landscapes, settled areas, important routes and attractions. A variety of landscape character types and locations from different directions and distances have also been represented. It should be noted that while the majority of the viewpoints are chosen to represent receptors that have potential to undergo a significant effect this is not always the case, and some viewpoints that are included demonstrate a lower level of visibility from certain locations. Agreement of these viewpoints was sought from Stirling Council and NatureScot at the Scoping stage, with NatureScot confirming that they had no comments on the proposed list and no specific comments received from Stirling Council.

7.4.50 The viewpoints included in the assessment are set out in **Table 7-6**, and detailed assessment for each of these is presented in Section 7.8. The viewpoint locations



are shown in conjunction with the blade tip ZTV on **Figures 7.6a-c** and the hub height ZTV on **Figures 7.7a-c**.

Table 7-6: Representative Viewpoints

No.	Viewpoint	Easting	Northing	Distance (km)	Receptor
1	Sir John de Graham's Castle	268129	685834	1.2	Visitors
2	Carron Valley Reservoir Long Distance Path	267460	684489	2.5	Recreational walkers/ cyclists
3	Carron Valley Forestry Commission Car Park	272131	683865	2.1	Recreational walkers/ cyclists
4	Carron Valley Reservoir Shore Trail	270492	683260	2.1	Recreational walkers/ cyclists
5	Minor road near Easter Cringate Cottage*	271792	687454	2.3	Road users / residents
6	Tomtain	272124	681409	4.2	Recreational walkers
7	Meikle Bin	266725	682177	4.7	Recreational walkers
8	Tak Ma Doon Road	273534	681527	4.8	Road users
9	Minor Road, near Easter Buckieburn*	275380	685675	4.7	Road users / residents
10	B822/ B818, south-east of Fintry*	261984	686508	7.2	Road users
11	Stronend	262957	689440	6.9	Recreational walkers
12	Earl's Seat	256985	683798	12.5	Recreational walkers
13	Stirling Castle	279026	693967	12.0	Visitors/ residents
14	Wallace Monument	280903	695659	14.5	Visitors
15	Dumyat	283557	697675	17.8	Recreational walkers
16	Lodge Forest Visitor Centre Aberfoyle	252046	701409	22.8	Visitors
17	Ben Ledi	256242	709773	26.7	Recreational walkers
18	Carron Valley Hamlet, by Reservoir Dam	271666	683938	1.7	Residents

7.4.51 *The night-time visual assessment has been informed by dusk photomontages for the following three viewpoint locations, which have been selected from the LVIA viewpoints. These viewpoints have been selected for night-time assessment on the



basis that they are locations where people may be present at dawn/ dusk, and where baseline conditions are likely to be relatively dark.

- Viewpoint 5: Minor road near Easter Cringate Cottage;
- Viewpoint 9: Easter Buckieburn; and
- Viewpoint 10: B822, south east of Fintry.

Preliminary Viewpoint Assessment

7.4.52 **Table 7-7** identifies which viewpoints require more detailed assessment in the LVIA because they have the potential to undergo significant effects (including cumulative effects), and which viewpoints do not require further detailed assessment.

Table 7-7: Preliminary Assessment of Viewpoints

No.	Viewpoint	Comments
1	Sir John de Graham's Castle	Included in the detailed assessment due to proximity and level of theoretical visibility of the Proposed Development.
2	Carron Valley Reservoir Long Distance Path	Included in the detailed assessment due to proximity and level of theoretical visibility of the Proposed Development.
3	Carron Valley Forestry Commission Car Park	Included in the detailed assessment due to proximity and level of theoretical visibility of the Proposed Development.
4	Carron Valley Reservoir Shore Trail	Included in the detailed assessment due to proximity and level of theoretical visibility of the Proposed Development.
5	Minor road near Easter Cringate Cottage	Included in the detailed assessment due to proximity and level of theoretical visibility of the Proposed Development.
6	Tomtain	Included in the detailed assessment due to proximity and level of theoretical visibility of the Proposed Development.
7	Meikle Bin	Included in the detailed assessment due to proximity and level of theoretical visibility of the Proposed Development.
8	Tak Ma Doon Road	Included in the detailed assessment due to proximity and level of theoretical visibility of the Proposed Development.
9	Minor Road, near Easter Buckieburn	Included in the detailed assessment due to proximity and level of theoretical visibility of the Proposed Development.
10	B822/ B818 south-east of Fintry	Included in the detailed assessment due to proximity and level of theoretical visibility of the Proposed Development.
11	Stronend	Included in the detailed assessment due to proximity and level of theoretical visibility of the Proposed Development.
12	Earl's Seat	Included in the detailed assessment due to the extent of the Proposed Development that is theoretically visible, and the potential for cumulative effects to arise.



13	Stirling Castle	The Proposed Development would form a relatively indiscernible addition to the baseline view due to its situation within the context of the operational Craigengelt Wind Farm. Landform screening also reduces the perceived scale of the wind turbines, and as a consequence it is considered that there isn't potential for significant effects to arise from this location. The viewpoint is therefore discounted from detailed assessment.
14	Wallace Monument	The Proposed Development would form a relatively indiscernible addition to the baseline view due to its situation within the context of the operational Craigengelt Wind Farm. Landform screening also reduces the perceived scale of the turbines, and as a consequence it is considered that there is not potential for significant effects to arise from this location. The viewpoint is therefore discounted from detailed assessment.
15	Dumyat	Included in the detailed assessment due to the extent of the Proposed Development that is theoretically visible, and the potential for cumulative effects to arise.
16	Lodge Forest Visitor Centre Aberfoyle	Three blade tips associated with the Proposed Development would be theoretically visible from the viewpoint at a distance of over 22km. The blades would be situated within the context of the consented Shelloch Wind Farm, and within the same sector of the view as the operational Earlsburn and Earlsburn North Wind Farms. The Proposed Development would therefore form a relatively indiscernible addition to the baseline view, and there is no potential for significant effects to arise from this viewpoint.
17	Ben Ledi	All of the proposed wind turbines would be theoretically visible from the summit of Ben Ledi at a distance of over 26km. The wind turbines would be situated directly beyond the Earlsburn and Earlsburn North Wind Farms, and while the wind turbines are notably larger than these wind farms, the increase in scale would not be sufficient to alter the nature of the influence of these existing wind farms on the view. The larger vertical scale of the Proposed Development would also be less apparent in the event that the consented Shelloch Wind Farm is constructed. As a consequence, it is considered that significant effects would not arise upon the view, and the viewpoint is therefore discounted from detailed assessment.
18	Carron Valley Hamlet, by Reservoir Dam	Included in the detailed assessment due to proximity and level of theoretical visibility of the Proposed Development.



- 7.4.53 **Table 7-7** indicates that receptors at 14 of the viewpoints (VP1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 15, and 18) have potential to be significantly affected by the Proposed Development.

Night-time Environment

- 7.4.54 The theoretical baseline night-time environment is represented on a Baseline Light Pollution map (**Figure 7.14**), which illustrates baseline light pollution across the 20km Detailed Study Area and also shows the LVIA viewpoints.
- 7.4.55 While this map provides a useful basis for gauging theoretical levels of lighting at night-time, it is important to remember that it does not indicate the presence of localised lighting such as domestic or security lighting that can locally affect views at night-time. Personal lighting is also not represented; that is, lighting within or attached to a vehicle or train (e.g. internal lighting, headlights, dashboard etc.) that will be experienced by people travelling on roads and railway lines, which can have a considerable effect on the way that the night-time environment is experienced by people. Torches and cycle lights are also used by people walking or cycling during hours of darkness, and this light affects their environment/ dark adaptation and ability to appreciate the full intensity of other light sources.
- 7.4.56 Nonetheless, the map does provide a useful indication of lighting levels throughout the study area and at the viewpoints. In particular, it highlights the general darkness of the Site and the landscapes immediately surrounding it within a 5km radius, as well as the more distant landscapes to the north-west of the Site. Contrastingly, high levels of baseline lighting are experienced extensively to the north east, east, south east, south, and south west of the Detailed Study Area, where a large number of large settlements and routes are located.
- 7.4.57 Night-time visualisations are provided for three viewpoints (5, 9, and 10), and the photographs at these viewpoints illustrate the baseline night-time environment.

Cumulative Wind Farm Developments

- 7.4.58 Both NatureScot and GLVIA3 advise in their guidance that the assessment of the cumulative impacts associated with the Proposed Development should encompass the effects of the proposal in conjunction with existing, under construction, consented and application stage wind farms awaiting determination. Schemes that are at the pre-planning or scoping stage are generally not considered in the assessment of cumulative effects because firm information on which to base the assessment is not available. The list of proposals presented in NatureScot's 'Guidance - Assessing the cumulative landscape and visual impact of onshore wind energy developments'⁶ (2021) is as follows:
- *“existing development, either built or under construction;*
 - *approved development, awaiting implementation; and*
 - *proposals awaiting determination within the planning process with design information in the public domain. Proposals and design information may be deemed to be in the public domain once an application has been lodged, and the decision-making authority has formally registered the application.”*

⁶ <https://www.nature.scot/doc/guidance-assessing-cumulative-landscape-and-visual-impact-onshore-wind-energy-developments>



- 7.4.59 In this instance, there is inadequate design information to include schemes that are at the scoping stage in the cumulative assessment, and as a result they are not considered further in the detailed assessment of the LVIA.
- 7.4.60 In relation to whether or not wind farms are included in the cumulative assessment, NatureScot advises in its guidance (2021, p5) that:
- “The key principle for all impact assessments is to focus on the likely significant impacts and those which are likely to influence the outcome of the consenting process.”*
- 7.4.61 Consequently, sites that lie outwith a 20km radius of the Proposed Development have been discounted due to the local topography of the surrounding landscape and their distance from the Proposed Development. It is anticipated that the greatest influence would arise in relation to development closest to the Proposed Development, and as such the nearby operational Craigengelt, Craigannet, Earlsburn and Earlsburn North wind farms, consented Shelloch wind farm, and Earlsburn Extension application are of most relevance to the cumulative assessment. It will therefore be necessary to determine whether the addition of the Proposed Development would notably alter the perceived character of the local landscape, and how it would relate to these wind farms in key views.
- 7.4.62 The scale of wind farm and other development is also of relevance to the cumulative assessment. Generally, the larger the development the higher the likelihood of a significant cumulative effect. Single wind turbines and those below 50m tip height are not included in the detailed assessment in line with NatureScot guidance (NatureScot, 2021), which states that ‘due to the very large number of small scale (three or fewer wind turbines) proposals in the planning system in some areas of Scotland it may not be practical to include all of these in the search area base plan’.
- 7.4.63 The cumulative situation changes frequently as applications are made or withdrawn, and the layouts of submitted application wind farms are changed. It is therefore necessary to agree on a cut-off date when the sites and layouts to be included are fixed. This has been set at the 21 April 2026. Any changes in the cumulative situation, including status, after the cut-off date have not been incorporated into the assessment.
- 7.4.64 Wind farm sites and single wind turbines that are over 50m to tip height that lie within a 20km radius of the Proposed Development are shown on **Figure 7.12** and listed in **Table 7-8**.

Table 7-8: Cumulative wind energy development within a 20km radius

Name / Status	Distance to nearest proposed turbine (km)	Number of turbines	Maximum Blade tip height (m)
Operational/ Under Construction			
Craigannet	0.6	1	102
Earlsburn	1.0	15	110
Craigengelt	1.7	8	125
Earlsburn North	3.0	9	115
Durieshill	10.4	1	51
Tod Hill	13.0	4	125



Name / Status	Distance to nearest proposed turbine (km)	Number of turbines	Maximum Blade tip height (m)
Rosehill Farm	15.4	3	100
Bellstane Farm	15.5	1	86.5
Easter Glentore	17.8	1	102
Greengairs East	18.1	8	149.9
Greendykeside	18.2	2	100
Braidenhill Farm	18.7	1	74
Greencraig	19.1	1	99.5
Consented			
Shelloch	2.9	5	180
Earlsburn Extension	3.6	7	149.9
Bartlett Factory	18.1	1	90
Application / Appeal			
Drummarnock	2.7	4	180
Scoping			
None	-	-	-

7.4.65 All operational and under construction sites are included in the baseline assessment as they form a part of the baseline situation. Their presence has the potential to influence the assessment of effects on landscape character and the assessment of effects on views. The cumulative assessment of the operational and under construction sites, as well as the consented and application sites, is presented afterwards in the cumulative assessment for each landscape and visual receptor. Due to the degree of uncertainty in relation to the progression of the scoping stage sites, and also elements of their design, they are not considered in the detailed assessment of cumulative effects.

Summary of Baseline Conditions and Preliminary Assessment

7.4.66 This section has described the baseline of the Study Area, including a review of landscape character, landscape-related planning designations, principal visual receptors (including settlements and routes), viewpoints and cumulative wind farms. It also includes a preliminary assessment of the effect that the Proposed Development would have on these various landscape and visual receptors, and the findings of this preliminary assessment are summarised below.

7.4.67 The following aspects of the landscape and visual resource have potential to undergo significant effects (including cumulative effects) as a result of the Proposed Development and require detailed assessment subsequently in this Chapter:

- Landscape elements:
 - Conifer Plantation Forestry
- Landscape character receptors:
 - 3. Forested River Basin - Carron Valley;



- 7d. Lowland Hills - Fintry, Gargunnoch and Touch Hills;
- 216. Rugged Moorland Hills;
- 7c. Lowland Hills - Campsie Fells;
- 149. Lowland Hills – Central;
- 2. Rolling Valley Farmland - Middle Endrick Water; and
- 2. Rolling Valley Farmland - Lower Endrick Water.
- Landscape designations:
 - Southern Hills LLA;
 - Kilsyth Hills SLA;
 - Denny Hills SLA; and
 - Campsie Fells LLA.
- Principal visual receptors:
 - Settlements – Fintry and Balfron;
 - Roads - B818 and B822; and
 - Core paths – 9078, NL/1/1, NL/10/1, NL/6/1, and NL/7/1.
- Viewpoints:
 - Viewpoint 1: Sir John de Graham's Castle;
 - Viewpoint 2: Carron Valley Reservoir Long Distance Path;
 - Viewpoint 3: Carron Valley Forestry Commission Car Park;
 - Viewpoint 4: Carron Valley Reservoir Shore Trail;
 - Viewpoint 5: Minor road near Easter Cringate Cottage;
 - Viewpoint 6: Tomtain;
 - Viewpoint 7: Meikle Bin;
 - Viewpoint 8: Tak Ma Doon Road;
 - Viewpoint 9: Easter Buckieburn;
 - Viewpoint 10: B822, south-east of Fintry;
 - Viewpoint 11: Stronend;
 - Viewpoint 12: Earl's Seat;
 - Viewpoint 15: Dumyat; and
 - Viewpoint 18: Carron Valley Hamlet, by Reservoir Dam.

7.5 Assessment of Physical Landscape Effects

- 7.5.1 The first category of effects covered in the assessment is physical effects, which are direct effects on the fabric of the Site, such as the removal of ground cover vegetation. Physical effects are found only on the Site, where existing landscape elements may be removed or altered by the Proposed Development. This category of effects is made up of landscape elements, and, in this case, this comprises mainly coniferous plantation forestry. It should be noted that landscape elements are assessed with reference to their contribution to the landscape character rather than in ecological terms.



- 7.5.2 The methodology for the assessment of physical landscape effects is described in full in **Technical Appendix 7.1**.

Conifer Plantation Forestry

Baseline

- 7.5.3 Commercial forestry covers the majority of the Site, with existing forestry tracks providing access across the forest that covers the slopes of Cairnoch Hill. The forestry comprises predominantly sitka spruce with open, linear corridors associated with watercourses/drains and access tracks. The edges of many of the forest blocks are geometric and do not correspond with the more organic shape of the landform, denoting the human influence in their cultivation and management. The overall appearance is of a relatively varied age, single species commercial forest.

Sensitivity

- 7.5.4 The landscape and visual value of the conifer plantation forestry is low. Coniferous forestry is a common feature in this part of the locally designated landscape. However, it possesses a relatively unkempt character, due to its uneven age profile, which reinforces the human influence upon the forest.
- 7.5.5 The most important consideration that reduces its sensitivity to change is the fact that the forestry has been planted as a commercial crop, with the intention that it will eventually be felled and replanted. It is not indigenous or naturalised woodland and does not contribute to the integrity of the landscape or typify its inherent character. This is evident from the use of single species, the geometric layout of the plantations and the rotational systems of planting and clear felling which mean large areas are the same age and are likely to be felled at the same time. There is also a high potential for mitigation as the replanting of forestry is straightforward and part of standard forestry management. The susceptibility of the forestry is therefore low.
- 7.5.6 The value of the coniferous forestry is low on account of its cultivated origins as a crop and contrived appearance, and its susceptibility is low due to the relative ease with which it can be reinstated. The combination of these factors results in a **low** sensitivity being attributed to the coniferous forestry on the Site.

Magnitude of Change

- 7.5.7 All four of the proposed wind turbines (and associated crane hardstandings), the substation, permanent met mast, and temporary construction compounds, and sections of the access tracks would be located in the areas of forestry that occur on Site.
- 7.5.8 It is proposed that some areas of the forest would be felled during the construction of the Proposed Development (see **Figure 3.2.6 of Technical Appendix 3.2: Forestry**) to accommodate these elements. In order to minimise these direct effects, it is proposed that keyhole felling around the wind turbines would be undertaken to minimise the area of the forest that would be lost permanently, and felling of forestry for the access tracks would affect a relatively narrow corridor. As a consequence, it is likely that the felled areas of forestry would be indiscernible from many parts of the surrounding landscape, due to the screening provided by the remaining forest areas that surround them. The magnitude of change on the physical element of coniferous forestry would be **medium-low**, relating to the localised loss of some mature tree species.



Significance of Effect

- 7.5.9 The physical effect of the Proposed Development on the conifer plantation forestry would be **minor** and **not significant**, with the forestry still providing a defining influence over the landscape of the Site. This is primarily due to the low sensitivity of the landscape element and the high potential for the mitigation of any direct effects.

7.6 Assessment of Effects on Landscape Character

- 7.6.1 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, which may alter the way in which the pattern of elements is perceived.
- 7.6.2 Landscape character receptors fall into two groups:
- LCTs; and
 - Designated areas.
- 7.6.3 The assessment of effects on these receptors is described in the following sections of this chapter. The detailed methodology for the assessment of effects on landscape character is described in **Technical Appendix 7.1**.
- 7.6.4 It should be noted that levels of magnitude of change on landscape character receptors are generally found to be lower than the magnitude of change on viewpoints that lie within these receptors. This means, for example, that if a viewpoint is assessed to undergo a high-medium magnitude of change it does not necessarily follow that the landscape character receptor within which it lies would also undergo a high-medium magnitude of change but may undergo a medium magnitude of change instead. This is because the effects on viewpoints are assessed within the context of a specific outlook towards the Site and are usually specifically selected to gain a direct view over the Proposed Development. The Proposed Development is therefore the principal consideration in the viewpoint assessment, and influences that lie in other areas of the view are of lesser relevance to the assessment. The landscape character of a receptor is not, however, determined so specifically by the outlook over the Proposed Development, and there are many other considerations, both visual and perceptual, that combine to give an area its landscape character. This means that the degree of influence of the Proposed Development on landscape character may be lower than its influence on a specific view.
- 7.6.5 Viewpoints are referred to in this assessment as they do give a useful indication of the appearance of the Proposed Development from the landscape receptors, but the level of magnitude of change may vary between the viewpoint assessment and the landscape character assessment. This is particularly true of areas that lie slightly further away from the Site. In the immediate vicinity of the Site, typically up to around 2km to 3km away – the magnitude of change on viewpoints and landscape character is likely to be similar, but beyond this, the magnitude of change on landscape character is found to often diminish more rapidly as the influence of the turbines is subsumed in the many other influences on landscape character.

Assessment of Effects on LCTs

- 7.6.6 The LCTs that cover the Study Area are shown on **Figure 7.3** and in conjunction with the ZTV on **Figures 7.9a-b**.



7.6.7 **Section 7.6** presents a review of LCTs within the Detailed Study Area. This has found that the following LCTs have the potential to undergo significant effects and therefore require a detailed assessment in the LVIA:

- 7d. Lowland Hills - Fintry, Gargunnock and Touch Hills;
- 3. Forested River Basin - Carron Valley;
- 216. Rugged Moorland Hills;
- 7c. Lowland Hills - Campsie Fells;
- 149. Lowland Hills – Central;
- 2. Rolling Valley Farmland - Middle Endrick Water; and
- 2. Rolling Valley Farmland - Lower Endrick Water.

7.6.8 The effect on each of these LCTs is assessed below. The LCTs that cover the remainder of the Study Area were found through the review process to not have the potential to be significantly affected and have therefore not been assessed in any further detail.

7d. Lowland Hills - Fintry, Gargunnock and Touch Hills LCT

Baseline

7.6.9 The Proposed Development is located in the Lowland Hills – Fintry, Gargunnock and Touch Hills LCT, and it covers the aforementioned hill ranges and the hills surrounding Loch Coulter Reservoir. The LCT extends approximately 13km between Stronend in the west and North Third Reservoir in the east, and approximately 7km between Cairnoch Hill in the south and Carleatheran in the north.

7.6.10 The following characteristics of this LCT have been extracted from Stirling Council's Draft Supplementary Guidance: Landscape Character Assessment:

"Northern Escarpment:

- *The northern escarpments play an important role in the overall landscape composition of the Forth Valley and with their extensive visual envelope and large viewing populations, have a very high level of visual sensitivity.*
- *Wind energy developments have had an effect on these important hill edges.*
- *The lava flows which have resulted in the distinctive step-like appearance of the escarpment have high natural heritage interest.*

Hill Plateau:

- *A landscape that has undergone significant change in recent years with the introduction of large wind turbines over part of the core area.*
- *The hill-plateau still has a simplicity and unity of landform, but this has been affected by wind farm developments.*
- *In core areas and away from wind farms, the hills are still open and lack subdivision by roads, fences or other structures. Reservoirs and forestry continue to provide visual diversity and scale reference points at the local level.*



- *Dramatic panoramic views are still to be had from this landscape, but in some areas the eye can be drawn to the new focal points created by the windfarms.*
- *The hills as a whole form an integral part of the wider Southern Hills Local Landscape Area.”*

- 7.6.11 As mentioned above, the operational Earlsburn, Earlsburn North, Craigengelt and Craigannet Wind Farms form existing characteristics across much of the LCT, but particularly its central and southern parts.
- 7.6.12 The characteristics of the LCT are illustrated in the visualisations for Viewpoint 5 (Minor road near Easter Cringate) (**Figure 7.21**), Viewpoint 9 (Minor Road, near Easter Buckieburn) (**Figure 7.25**), and Viewpoint 11 (Stronend) (**Figure 7.27**).

Sensitivity

- 7.6.13 The Fintry, Gargunnock and Touch Hills unit of the Lowland Hills LCT has a high-medium value. The LCT lies within the Southern Hills LLA, and while the LCT has been subject to recent change from wind farm developments, it possesses some recreational and scenic value. The absence of stronger naturalness qualities and its local level landscape designation preclude the highest value being attributed to the LCT.
- 7.6.14 The Fintry, Gargunnock and Touch Hills unit of the Lowland Hills LCT generally has a medium-low susceptibility to the Proposed Development, although it varies slightly across its extents. Overall, the openness, large scale and the extent of existing wind farm development and occasional telecommunication masts reduce the susceptibility of the broad interior of the LCT, but susceptibility is increased around the fringes of the LCT where these areas form backdrops and skylines to surrounding lowland LCTs.
- 7.6.15 The combination of the value of the landscape and its susceptibility to the Proposed Development leads to an overall **medium** rating for sensitivity.

Magnitude of Change

- 7.6.16 The Proposed Development lies close to the southern boundary of this LCT unit, with theoretical visibility predicted across large swathes of the LCT unit at distances of up to 6-7km, including parts of the Fintry Hills and the Gargunnock Hills. These ranges contain the following notable hills: Stronend, Carleatheran, Lee's Hill, Ling Hill, Hart Hill, Earl's Hill, and Craigengelt Hill. A large proportion of these potentially affected areas are subject to an existing influence from the operational Earlsburn, Craigengelt and Craigannet Wind Farms (see **Figures 7.13a** and **7.13b**), which are also located within this LCT unit. There is also some theoretical visibility predicted across slightly less elevated parts of the LCT unit around Loch Coulter Reservoir. Theoretical visibility of the Proposed Development is predicted to be more limited to the north-east of the LCT unit across the Touch Hills.
- 7.6.17 Factors that increase the magnitude of change are:
- The extensive areas of theoretical visibility predicted across the immediate landscape within the LCT unit surrounding the Proposed Development at distances of up to around 7km;
 - The large scale of the proposed wind turbines and the permanent anemometer mast;
 - The felling of forestry associated with the Proposed Development;



- The position of the Proposed Development on the southern edge of the LCT unit, which has an association with Carron Valley;
- The increase in the influence of wind farms across southern parts of the LCT unit;
- The larger vertical scale of the proposed wind turbines relative to other operational wind farms within the LCT, in particular the Craigannet turbine; and
- The stark forestry patterns associated with keyhole felling around the turbine bases.

Factors that moderate the magnitude of change are:

- The relatively small number of wind turbines proposed which would limit the extent of direct effects on the LCT;
- The relatively compact form of the Proposed Development which would occupy a relatively narrow horizontal angle of the landscape;
- The relatively large scale and simplicity of the undulating landform;
- The location of the Proposed Development within an area of the LCT that has been modified by commercial forestry;
- There would be limited theoretical visibility of the Proposed Development within the context of the northern escarpment from the Forth valley;
- While there are smaller scale valleys in the surrounding landscape, the Proposed Development would be broadly situated in an open, and expansive setting, which possesses a larger scale; and
- The Proposed Development is not an entirely new characteristic influence from some of the affected parts of this LCT unit.

7.6.18 Taking these factors into account, the magnitude of change for this LCT would be **high** across the LCT at distances of up to around 2-3km, where theoretical visibility is predicted, with the magnitude of change reducing to a lower level, typically **medium**, where the closer influence of other operational wind farms is more apparent, for example across parts of Craigengelt and Hart Hills and Cringate Law. At greater distances, where theoretical visibility of the Proposed Development is predicted at distances of between 3-7km, the magnitude of change is likely to reduce to between **medium** and **low**. This is due to a combination of the more limited influence of the Proposed Development at greater distances, but also the increasing influence of wider operational wind farms relative to the Proposed Development (see Viewpoints 9 (Easter Buckieburn) and 11 (Stronend)). All other areas where theoretical visibility is predicted would experience a **low** or **negligible** magnitude of change, and where no theoretical visibility is predicted there would be **no change**.

Significance of Effect

7.6.19 The effect of the Proposed Development on the landscape character of the Fintry, Gargunnock and Touch Hills unit of the Lowland Hills LCT where theoretical visibility is predicted to be highest would be at worst **major-moderate** and **significant** at distances of up to around 3km, while effects predicted across all other parts of the LCT would **moderate or lower** and **not significant**.



Cumulative Assessment

- 7.6.20 In relation to the consented cumulative scenario, there is theoretical cumulative visibility of the Proposed Development with the consented Shelloch and Earlsburn Extension wind farms predicted across large parts of the Fintry and Gargunnock Hills to the north and north west of the LCT unit, but also more intermittently across some south western parts of the LCT unit (see **Figure 7.13f-g**). While the Earlsburn Extension and Shelloch Wind Farms would intensify the influence of existing wind farm development within the central parts of the LCT in combination with the operational Earlsburn and Craigengelt Wind Farms, the Proposed Development would intensify the influence of wind farms further to the south of the LCT. When apparent together, the larger vertical scale of the turbines relative to the existing operational Earlsburn and Craigengelt turbines would tend to increase the cumulative magnitude of change, while the relatively modest horizontal extent of the Proposed Development would moderate it. Furthermore, across the majority of the affected parts of the LCT unit, the presence of the nearby operational Earlsburn and Craigengelt would ensure that the Proposed Development would often be viewed within the context of closer wind turbines, which would tend to moderate the additional influence of the Proposed Development. In summary, a **low** cumulative magnitude of change is generally predicted to arise across the majority of the LCT unit, with some localised areas immediately to the north of the Proposed Development where the presence of the wind turbines within undeveloped northern views would exacerbate existing cumulative effects, and as such a **high-medium** cumulative magnitude of change is predicted.
- 7.6.21 In relation to the application-stage cumulative scenario, the four Drummarnock wind turbines would be located to the north east of the operational Craigengelt Wind Farm, with cumulative visibility predicted intermittently across south eastern, central and western parts of the LCT unit (see **Figure 7.13i**). The Drummarnock wind turbines would tend to form a modest addition to the overall cumulative baseline, largely apparent within the same context as the operational Craigengelt wind turbines. Given the limited change to the broader pattern of cumulative wind farm development, it is likely that cumulative magnitude of change in this scenario would remain at a **high-medium** level.
- 7.6.22 In summary, the Proposed Development would tend to result in **moderate-minor** and **not significant** effects across the majority of the LCT unit in the consented and application-stage cumulative scenarios, with some localised **moderate** and **significant** cumulative effects predicted in the closest areas immediately to the north of the Proposed Development.

3. Forested River Basin - Carron Valley LCT

Baseline

- 7.6.23 The Carron Valley unit of the Forested River Basin LCT encompasses the majority of Carron Valley Reservoir and a large proportion of its containing, forested hill slopes that rise to the south-west, west, north, and north-east. The containing hill slopes to the south of Carron Valley Reservoir are categorised separately by the NatureScot LCA, and they are therefore not included in this LCT unit. In addition to the reservoir and its containing slopes, the north west of the LCT contains the valley associated with the upper reaches of the Endrick Water.
- 7.6.24 The following characteristics of this LCT have been extracted from Stirling Council's Draft Supplementary Guidance: Landscape Character Assessment:



- *“Medium to large scale, enclosed, simple landscape, dominated by the basin-like landform, forested slopes and expanse of reservoir.*
 - *Strong sense of enclosure and introspection within the valley and forested slopes, although panoramic views from the open hill tops allow appreciation of the setting in the wider landscape.*
 - *An important commercial forestry area that is planned for long-term retention and production, although environmental improvements are being made through layout and forest design as the timber is harvested. The on-going programme of felling and restocking, combined with nearby windfarm developments makes this a landscape of change.*
 - *Settlement is sparse, confined primarily to the eastern end of the valley and close to the B818. Small groups of houses are found at a few locations, otherwise settlement is dispersed.*
 - *The simple composition of water and afforested hillside, combined with very little settlement creates a moderately remote atmosphere.*
 - *Scenic and recreational importance of this landscape and the encircling hills, are recognized by a Local Landscape Area designation.”*
- 7.6.25 In addition to these primary characteristics, in recent years the LCT has been subject to an increasing influence from operational wind farm development situated in neighbouring LCTs to the north, such as Earlsburn and Earlsburn North. These wind farms are occasionally apparent on the containing skylines of the valley and as a result form an existing characteristic of the local landscape.
- 7.6.26 The characteristics of the closest parts of LCT are illustrated in the visualisations for Viewpoint 1 (Sir John de Graham's Castle) (**Figure 7.17**) and Viewpoint 2 (Carron Valley Reservoir Long Distance Path) (**Figure 7.19**), which are all located around the southern edge of this LCT.

Sensitivity

- 7.6.27 The Carron Valley unit of the Forested River Basin LCT has a high-medium value. The LCT lies within the Southern Hills LLA, and while the land-use pattern of this landscape unit is characterised by its extensive commercial forestry and man-made reservoir, its elements form a relatively homogenous landscape that possesses some recreational and scenic value. The absence of stronger naturalness qualities and its local level landscape designation preclude a higher value being attributed to the LCT.
- 7.6.28 The Carron Valley unit of the Forested River Basin LCT generally has a medium susceptibility to the Proposed Development, although it varies slightly across its extents. Overall, the character of the relatively simple, man-modified landscape reduces the LCT's susceptibility to wind farm development, but the enclosure of parts of the local landscape increases its susceptibility to the introduction of very large-scale elements, such as wind turbines. Where the expansiveness of the wider landscape can be experienced on more elevated hill slopes, and the influence of wind farm development located in neighbouring LCTs is apparent, the susceptibility of the LCT is lower.
- 7.6.29 The combination of the value of the landscape and its susceptibility to the Proposed Development leads to an overall **high-medium** rating for sensitivity.



Magnitude of Change

- 7.6.30 The proposed wind turbines are located outwith the Carron Valley unit of the Forested River Basin LCT unit however parts of their associated infrastructure are located within the LCT. Effects of the Proposed Development would therefore be primarily indirect and associated with the Proposed Development's influence on its surrounding landscape, but there would also be some direct effects upon areas of commercial forestry, which are described in Section 7.6.
- 7.6.31 The proposed wind turbines are situated close to the northern boundary of this LCT unit, with theoretical visibility predicted across the majority of the LCT unit at distances of up to 5km, with the exception of areas of the west facing slopes of Little Bin, Meikle Bin, Craigannet Hill, and Gartcarron Hill. Much of the potentially affected areas are covered by extensive conifer forestry, associated with Carron Valley Forest, and therefore the influence of the Proposed Development would be affected by the enclosure it provides. More open areas of the LCT unit are relatively infrequent but can be found across Craigannet Hill, the summits of Little Bin and Meikle Bin, and around Todholes Farm, and as a result these areas are more susceptible to indirect effects from nearby wind farm development.
- 7.6.32 Factors that increase the magnitude of change are:
- The extensive areas of theoretical visibility predicted across the LCT unit at distances of up to around 5km;
 - The north-eastern aspect of many of potentially affected areas;
 - The large scale of the proposed wind turbines and the permanent anemometer mast;
 - The slightly reduced scale of some of the potentially affected lower valley areas;
 - The greater exposure of the north-western and south-eastern facing slopes of Cairnoch Hill from some of the areas to the north and south of the LCT unit;
 - The position of the Proposed Development close to the northern edge of the LCT unit, which increases the perceived scale of the wind turbines;
 - The increase in the influence of wind farms beyond the northern edge of the LCT unit;
 - The larger vertical scale of the proposed wind turbines relative to other operational wind farms within the LCT, such as Earlsburn and Craigengelt; and
 - The felling of forestry associated with the Proposed Development;
- 7.6.33 Factors that moderate the magnitude of change are:
- The relatively small number of wind turbines proposed which would limit the extent of direct effects on the LCT;
 - The situation of the proposed wind turbines just beyond the threshold of Carron Valley;
 - The location of the Proposed Development within an area of the LCT that has been modified by commercial forestry;
 - While the Carron Valley Reservoir shore possesses a slightly smaller scale, the Proposed Development would be situated in a more open, and expansive part of the landscape, associated with the upland ridge of Cairnoch Hill; and
 - The Proposed Development is not an entirely new characteristic influence from some of the affected parts of this LCT unit.



- 7.6.34 Taking these factors into account, where theoretical visibility is predicted, the magnitude of change across the LCT within 5km of the Proposed Development is likely to range between **high** and **medium** depending on the extent of visibility predicted, with the exception of large areas of commercial forestry that possess a strong degree of enclosure. Effects of a **medium** and **high** magnitude of change are therefore likely to arise along more open areas close to the shoreline of Carron Valley Reservoir and on the more elevated slopes of Little Bin, Meikle Bin, Craigannet Hill, and Gartcarron Hill respectively. Where forestry enclosure is present across the LCT unit, a **negligible** magnitude of change or **no change** is predicted, and there would be **no change** across all other parts of the LCT unit where theoretical visibility is not predicted to arise.

Significance of Effect

- 7.6.35 The effect of the Proposed Development on the landscape character of the Carron Valley unit of the Forested River Basin LCT where theoretical visibility is predicted and there is no enclosure from commercial forestry would vary between **moderate** and **major** and in both instances **significant**, due to the closer location of the proposed turbines relative to operational wind farms. Effects would reduce to **negligible** and **not significant** or **no change** across the majority of the LCT unit where the enclosure from forestry moderates effects.

Cumulative Assessment

- 7.6.36 In relation to the consented cumulative scenario, there are areas of theoretical cumulative visibility with the consented Shelloch and Earlsburn Extension wind farms to the south, north west and north of the LCT unit (see **Figure 7.13f-g**). The introduction of these consented developments would intensify the characteristic influence of wind farms within the hills to the north of the LCT unit, and Shelloch would also increase the arc of wind farm development to the north west of the LCT unit. The Proposed Development would be situated to the north of the LCT unit, albeit closer, and would often appear to be situated within a gap between the Earlsburn and Earlsburn Extension wind farm cluster and the Craigengelt and Craigannet cluster. The closer location of the Proposed Development and its situation in between these two wind farm clusters would increase the cumulative magnitude of change by bringing wind farm development closer to the view and also reducing the spacing between existing wind farm clusters. The enclosure provided by the extensive conifer forestry on hill slopes would moderate these effects. A **high** cumulative magnitude of change would therefore arise across affected areas outwith commercial forestry in the consented cumulative scenario. Where extensive conifer forestry is present, it is likely that the cumulative magnitude of change would be considerably lower.
- 7.6.37 In relation to the application-stage cumulative scenario, the Drummarnock Wind Farm application would be apparent to the north east of the LCT unit from areas to the south, north-west and north-east of the LCT unit (see **Figure 7.13i**), situated within the context of the operational Craigengelt Wind Farm. The Drummarnock Wind Farm application would therefore slightly intensify the influence of wind farms within this part of the wider landscape, without increasing the arc of wind farm development to the north of the LCT unit. The cumulative effects of the Proposed Development in this scenario would therefore be relatively similar to those predicted in the consented cumulative scenario due to the similar pattern of wind farm development in the wider landscape. The cumulative magnitude of change would therefore remain at an at worst **high** level.
- 7.6.38 In summary, the Proposed Development would result in localised **major** and **significant** cumulative effects in the consented and application-stage cumulative



scenarios where there is no enclosure provided by the extensive conifer forestry. Where extensive conifer forestry is present, it is likely that effects would be lower and **not significant**.

216. Rugged Moorland Hills LCT

Baseline

- 7.6.39 The Rugged Moorland Hills LCT is located approximately 2km to the south of the Proposed Development, and it encompasses part of the Campsie Fells and the Kilsyth Hills. The LCT extends approximately 19km between Earl's Seat in the west and High Banton in the east, and approximately 4km between Milton of Campsie and Meikle Bin in the north.
- 7.6.40 The following 'Key Characteristics' of this LCT have been extracted from NatureScot's National LCA:
- *"Large-scale simple landscape.*
 - *Distinctive upland character created by the combination of elevation, exposure, rugged landform, including a fault line and cliffs, moorland vegetation and the predominant lack of modern development, emphasised by the proximity to low-lying valleys and coastal areas.*
 - *Undeveloped skylines and striking views to the Glasgow conurbation.*
 - *Extensive man-made reservoirs and smaller natural lochs.*
 - *Important backdrop to neighbouring settled landscapes, creating a unique sense of place.*
 - *Sparse settlement and predominant lack of modern development.*
 - *Presence of archaeological sites on hilltops and sides, and on lower ground.*
 - *Sense of apparent naturalness, wild character and remoteness which contrasts strongly with the farmed and developed lowland areas.*
 - *Diversity of landscape experience."*
- 7.6.41 The characteristics of the LCT are also illustrated in the visualisations for Viewpoint 3 (Carron Valley Forestry Commission Car Park) (**Figure 7.19**), Viewpoint 4 (Carron Valley Reservoir Shore Trail) (**Figure 7.20**), Viewpoint 6 (Tomtain) (**Figure 7.22**), Viewpoint 8 (Tak Ma Doon Road) (**Figure 7.24**), and Viewpoint 12 (Earl's Seat) (**Figure 7.28**), which are located either in or close to the boundary of this LCT.
- 7.6.42 There are no wind farms located within this LCT, but there is an influence from some distant wind farm development across a few elevated locations as illustrated by cumulative ZTV **Figures 7.13a-g**.

Sensitivity

- 7.6.43 The Rugged Moorland Hills LCT has a high-medium value. The LCT is partially covered by the Kilsyth Hills SLA, the Campsie Fells LLA, and the Glazert Valley LLA, and it possesses some recreational and scenic value. The narrow LCT unit is also relatively unspoilt, but its perceptual qualities are also influenced to a degree by its wider setting, which consists of the settled valley to the south and wind farm development to the north. The presence of man-made features such as



telecommunication masts and reservoirs within the LCT, its local level landscape designation, and the absence of any landscape designation across some areas, therefore preclude the highest value being attributed to the LCT.

- 7.6.44 The Rugged Moorland Hills LCT generally has a high-medium susceptibility to the Proposed Development, although it varies slightly across its extents. Overall, the openness, large scale and occasional telecommunication masts slightly reduce the susceptibility of the LCT, but its susceptibility is increased across the majority of areas where the generally undeveloped hills form backdrops and skylines to surrounding lowland LCTs.
- 7.6.45 The combination of the value of the landscape and its susceptibility to the Proposed Development leads to an overall **high-medium** rating for sensitivity.

Magnitude of Change

- 7.6.46 The Proposed Development is located outwith the LCT unit and there would therefore be no direct effects upon its character. Effects of the Proposed Development would therefore be indirect and associated with its influence on its surrounding landscape.
- 7.6.47 Theoretical visibility of the proposed wind turbines is predicted across the following notable areas of the LCT unit at distances of 2-12km: northern and/ or north-east facing slopes of the Kilsyth Hills, Box Knowe, Lecket Hill, Holehead, and Earl's Seat. Much of the potentially affected eastern areas are covered by extensive conifer forestry, associated with Carron Valley Forest, and therefore the influence of the Proposed Development would be moderated by the enclosure it provides. More open areas of the LCT unit associated with the summits of the aforementioned hills and the south-eastern shoreline of Carron Valley Reservoir are more susceptible to the proposed wind turbines.
- 7.6.48 Factors that increase the magnitude of change are:
- The extensive areas of theoretical visibility predicted across the north east of the LCT unit at distances of between 2-7km;
 - The northern aspect of many of potentially affected areas;
 - The large scale of the proposed wind turbines and the permanent anemometer mast;
 - The slightly reduced scale of some of the potentially affected lower valley areas;
 - The greater exposure of the south-eastern facing slopes of Cairnoch Hill from some of the areas to the north-east of the LCT unit;
 - The increase in the influence of wind farms to the north of the LCT unit;
 - The larger vertical scale of the proposed wind turbines relative to other operational wind farms within the LCT, such as Earlsburn and Craigengelt; and
 - The felling of forestry associated with the Proposed Development;
- 7.6.49 Factors that moderate the magnitude of change are:
- The relatively small number of wind turbines proposed;
 - The situation of the proposed wind turbines just beyond the threshold of Carron Valley;
 - The location of the Proposed Development within an area of the LCT that has been modified by commercial forestry;



- While the Carron Valley Reservoir shore possesses a slightly smaller scale, the Proposed Development would be situated in a more open, and expansive part of the landscape, associated with the upland ridge of Cairnoch Hill;
- The Proposed Development is not an entirely new characteristic influence from some of the affected parts of this LCT unit; and
- The Proposed Development would not affect the backdrop that this LCT unit provides to the neighbouring settled landscapes to the south.

7.6.50 Taking these factors into account, where theoretical visibility is predicted, the magnitude of change across the LCT within 6-7km of the Proposed Development is likely to range between **high** and **medium** depending on the extent of visibility predicted, with the exception of large areas of commercial forestry that possess a strong degree of enclosure. Effects of a **medium** and **high** magnitude of change are likely to arise along more open areas close to the shoreline of Carron Valley Reservoir and on the more elevated slopes of the Kilsyth Hills and Lecket Hill at distances of up to 7km respectively. At greater distances of between 8-12km, the magnitude of change would vary between **medium-low** and **low** across elevated hill slopes associated with Box Knowe and Earl's Seat. Where forestry enclosure is present across the LCT unit, a **negligible** magnitude of change or **no change** is predicted. There would be **no change** across all other parts of the LCT unit where theoretical visibility is not predicted to arise.

Significance of Effect

7.6.51 The effects of the Proposed Development on the landscape character of the Rugged Moorland Hills LCT where theoretical visibility is predicted and there is no enclosure from commercial forestry would vary between **moderate** and **major** and in both instances **significant** at distances of up to 6-7km, due to the closer location of the proposed wind turbines relative to operational wind farms. At greater distances of between 8-12km, the effects would vary between **moderate** and **moderate-minor** and **not significant** across elevated hill slopes associated with Box Knowe and Earl's Seat. Effects would reduce to **negligible** and **not significant** or **no change** across the majority of the LCT unit where the enclosure from forestry moderates effects, and there would be **no effects** across all other parts of the LCT unit where theoretical visibility is not predicted to arise.

Cumulative Assessment

7.6.52 In relation to the consented cumulative scenario, there is theoretical visibility of the consented Shelloch and Earlsburn Extension wind farms, which are situated within the hills to the north west and north of Carron Valley, across north facing slopes and summits, such as Holehead, Locket Hill and Garrel Hill, across the northern half of the LCT unit. The introduction of these consented developments would intensify the characteristic influence of wind farms within these nearby hills in part by reducing the separation between Earlsburn and Craigengelt Wind Farms and also by increasing the arc of wind farm development to the north-west of the LCT unit. The Proposed Development would be situated to the north of the LCT unit beyond Carron Valley, but closer, and as a consequence it would further intensify this characteristic of the wider landscape. The closer location of the Proposed Development would also increase the cumulative magnitude of change by bringing wind farm development closer to the LCT unit, while the enclosure provided by the extensive conifer forestry on lower hill slopes would moderate effects. A **high-medium** cumulative magnitude of change would therefore arise across affected areas outwith conifer forestry plantations.



- 7.6.53 In relation to the application-stage cumulative scenario, the Drummarnock application would also be visible across similar parts of the LCT unit to Shelloch and Earlsburn Extension, and would be apparent close to the operational Craigengelt Wind Farm, extending the arc of wind farms further to the north east of Carron Valley. The Drummarnock application would therefore further intensify the influence of wind farms to the north-east of the LCT unit. The cumulative effects of the Proposed Development in this scenario would therefore be relatively similar to those predicted in the consented cumulative scenario due to the similar pattern of wind farm development in the wider landscape. The cumulative magnitude of change would therefore remain at a **high-medium** level in the consented cumulative scenario.
- 7.6.54 In summary, the Proposed Development would result in **major-moderate** and **significant** cumulative effects in the consented and application-stage cumulative scenarios where there is no enclosure from the extensive conifer forestry. Where extensive conifer forestry is present, it is likely that effects would be lower and **not significant**.

7c. Lowland Hills - Campsie Fells LCT

Baseline

- 7.6.55 The Campsie Fells unit of the Lowland Hills LCT encompasses the most westernmost and north-westernmost parts of the Campsie Fells, including the Strathblane Hills to the north of Strath Blane, and the slopes to the west of Killearn and to the south of Fintry.

- 7.6.56 The following characteristics of this LCT have been extracted from Stirling Council's Draft Supplementary Guidance: Landscape Character Assessment:

"The Campsie Fells form the highest part of a larger hill-mass separating Glasgow and its associated industrial lowlands from the Forth Valley. The smooth rounded hill tops give way on their outward facing edges to dramatic ridges of rock and deep corries, above steep slopes, often furrowed by burns. Garloch Hill, Dumgoyne and many of the scarp features are designated Geological Conservation Review Sites - features of national and international importance representing some of the very best geological and geomorphological features of Britain. Some areas also have botanical interest and are designated as Sites of Special Scientific Interest. The whole area falls within the wider Southern Hills Local Landscape Area.

There is a well-defined transitional area of shelving heather moorland below the northern edge of the hills, where localised estate influences are evident and some areas of woodland present. Such transitional slopes and land use are largely lacking where the Fells tumble dramatically into Strath Blane (which separates the Fells from the Kilpatrick Hills to the west); and where the boundary between open hill and actively managed farmland/woods is very abrupt.

Blanket cover of peat and rough grassland, broken by patchy bracken on rockier slopes and clumps of rushes in damper depressions sweeps across the hill summits. This open landscape is interrupted in the east by a commercial plantation to one side of Gonachan Glen. Recent (2019) felling and restocking, using higher proportions of native broadleaves, should better integrate this feature in the landscape. Tree cover elsewhere is almost entirely confined to the lower reaches of burns and gullies fringing the hill mass – although sometimes of high nature conservation value, such as near the Spout of Ballagan. (The notable exception is another somewhat discordant conifer plantation, on the upper edge of the adjacent



Ballikinrain Muir beneath Barniemore and Jock's Cairn. Again felling and restocking following Scottish Forestry best practice guideline should improve landscape fit.

The hill mass is largely devoid of roads and tracks. The B822 skirts the easternmost perimeter of the hills. Elsewhere occasional tracks crawl up the lower slopes, one winding further into the hills through the Gonachan Glen forestry plantation and another serving the radar station at Holehead. Recognized footpaths access Dunmore Fort above Fintry and Dumgoyne, the remains of a volcanic plug and the westernmost feature of the Fells. Other less defined walking routes exist, making little impact, but encouraging recreational access and enjoyment.

The Campsie Fells typically appear very large in scale although the highest point, Earl's Seat, is only 578m AOD. There are few features on the hill tops or slopes giving a truer indication of scale; in addition the dramatic visual contrast between the hills, in particular the sometimes precipitous layered escarpments and lower more pastoral valleys and lowlands also exaggerate their height.

A popular recreational area, outward views for hill walkers are typically open and panoramic – although these now include windfarms in adjacent upland landscapes. Key views within the Fells for non-walkers are from the B822/Crow Road.”

- 7.6.57 The characteristics of the LCT are also illustrated in the visualisations for Viewpoint 10 (B822, south-east of Fintry) (**Figure 7.26**) and Viewpoint 12 (Earl's Seat) (**Figure 7.28**), which are located within or close to this LCT.
- 7.6.58 There are no wind farms located within this LCT, but there is an influence from some distant wind farm development across a few elevated locations as illustrated by cumulative ZTV **Figures 7.13a-g**.

Sensitivity

- 7.6.59 The Campsie Fells unit of the Lowland Hills LCT has a high-medium value. The LCT is covered in its entirety by the Southern Hills LLA, and it possesses some recreational and scenic value. It is relatively unspoilt with a relatively strong sense of place due to the distinctive forms of some of the hills and its wider setting that is partly influenced by the LLTNP, but the local level landscape designation precludes the highest value being attributed to the LCT.
- 7.6.60 The Campsie Fells unit of the Lowland Hills LCT generally has a high susceptibility to the Proposed Development. While its openness and large scale reduce the susceptibility of the LCT slightly, its susceptibility is increased across the majority of areas where the undeveloped hills form backdrops and skylines to surrounding lowland LCTs.
- 7.6.61 The combination of the value of the landscape and its susceptibility to the Proposed Development leads to an overall **high-medium** rating for sensitivity.

Magnitude of Change

- 7.6.62 The Proposed Development is located outwith the LCT unit and there would therefore be no direct effects upon its character. Effects of the Proposed Development would therefore be indirect and associated with its influence on its surrounding landscape.
- 7.6.63 Theoretical visibility of the Proposed Development across the LCT unit is generally contained to parts of Gonachan Glen and its containing slopes, as well as nearby



Campsie Muir, at distances of between 4-10km, and some elevated hill summits including and around Earl's Seat at distances of between 12-14km. The majority of these areas are open and susceptible to the effects of the Proposed Development, apart from the forested southern slopes of Gonachan Glen, where a degree of enclosure reduces the area's susceptibility to the indirect influences of distant wind turbines.

7.6.64 Factors that increase the magnitude of change are:

- The area of theoretical visibility predicted across Gonachan Glen and Campsie Muir at medium range distances of between 4-10km;
- The eastern aspect of many of potentially affected areas;
- The large scale of the proposed wind turbines and the permanent anemometer mast;
- The slightly reduced scale of some of the potentially affected lower valley areas;
- The increase in the influence of wind farms to the east of the LCT unit;
- The larger vertical scale of the proposed wind turbines relative to other operational wind farms within the LCT, such as Earlsburn and Craigengelt; and
- The felling of forestry associated with the Proposed Development;

7.6.65 Factors that moderate the magnitude of change are:

- The relatively small number of wind turbines proposed;
- The relatively compact form of the Proposed Development which would occupy a relatively narrow horizontal angle of the landscape;
- Some intervening landform screening of turbine towers would be experienced across lower valley/ hill slopes;
- The proposed wind turbines would appear to be situated within a larger scale upland landscape which from this direction has limited visible association with Carron Valley;
- The location of the Proposed Development within an area of the LCT that has been modified by commercial forestry; and
- The Proposed Development is not an entirely new characteristic influence from some of the affected parts of this LCT unit.

7.6.66 Taking these factors into account, the magnitude of change for this LCT would be at worst **medium-low** across the closest affected parts of the LCT unit around Gonachan Glen and Campsie Muir, with the magnitude of change reducing to **low** across more distant hill summits, such as Earl's Seat. There would be **no change** across all other parts of the LCT unit where theoretical visibility is not predicted to arise.

Significance of Effect

7.6.67 The effect of the Proposed Development on the landscape character of the Campsie Fells unit of the Lowland Hills LCT unit where theoretical visibility is predicted to be highest would be at worst **moderate** and **not significant** around Gonachan Glen and Campsie Muir, and would reduce to **moderate-minor or lower** and **not significant** across distant hill summits, such as Earl's Seat. There would be **no effects** across all other parts of the LCT unit where theoretical visibility is not predicted to arise.



Cumulative Assessment

- 7.6.68 In relation to the consented cumulative scenario, there is theoretical visibility of the consented Shelloch and Earlsburn Extension wind farms across parts of the north east of the LCT unit, such as Campsie Muir and the hill slopes around Gonachan Glen, and also around the elevated summit of Earl's Seat. The introduction of these consented developments would intensify the characteristic influence of wind farms within the hills to the north east of the LCT unit but would not materially alter the existing pattern of wind farm development in the surrounding landscape. The Proposed Development would be situated further to the south of these hills within a similar part of the landscape to the operational Craigengelt Wind Farm, but would also extend slightly further westwards towards the Earlsburn Wind Farm. The Proposed Development would therefore reduce the separation between the existing wind farm clusters, and this would increase the cumulative magnitude of change. These cumulative effects would tend to reduce in magnitude at lower elevations where levels of cumulative visibility reduce due to screening from intervening landform. The closer location and larger scale of the proposed turbines would further intensify the influence of wind farm development within this part of the surrounding landscape. Altogether, where cumulative visibility is predicted, the cumulative magnitude of change would vary between **medium** and **medium-low** depending on the intervening distance and the extent of cumulative visibility.
- 7.6.69 In relation to the application-stage cumulative scenario, the Drummarnock Wind Farm proposal would be discernible beyond the operational Craigengelt Wind Farm and it would therefore form a modest addition to the overall cumulative baseline, without altering the broader pattern of development in the surrounding landscape. The cumulative magnitude of change would therefore remain at a **medium to medium-low** level in the application-stage cumulative scenario.
- 7.6.70 In summary, the Proposed Development would result in **moderate** and **not significant** cumulative effects in the consented and application-stage cumulative scenarios.

149. Lowland Hills – Central LCT

Baseline

- 7.6.71 The area of the Lowland Hills – Central LCT considered in this LVIA occupies a small area to the south-east of Carron Bridge, primarily encompassing the slopes and summits of Darrach Hill, Denny Muir and Birns and the eastern reaches of the Carron Valley Forest, which extends approximately 3km from east to west and 3km from north to south.
- 7.6.72 The following 'Key Characteristics' of this LCT have been extracted from NatureScot's National LCA:
- *"Prominent, open, large scale character, of predominantly smooth, gently rounded upper slopes and hill summits.*
 - *Simplicity and unity of landform.*
 - *Hills covered in rolling expanses of peatland, rough grass and heather moorland.*
 - *Occasional, widely scattered blocks of coniferous forest.*



- *Almost entirely uninhabited landscapes, with any dwellings widely dispersed, often located to the edge of single-track roads which zigzag across lower ground.*
- *Recreational use is mainly restricted to the fringes of the hills and higher tops, which provide greater visual interest.*
- *Important close visual interrelationships between the hills and escarpments, and neighbouring lowland and carseland areas.*
- *Open character, absence of current settlement and limited penetration by roads or hill tracks create a refuge of remoteness in close proximity to densely settled areas.*
- *Hills often act as a buffer between more intensively used and populated areas. They create a strong contrast to these areas, and provide a sometimes dramatic backdrop.”*

7.6.73 The characteristics of the LCT are also illustrated in the visualisations for Viewpoint 8 (Tak Ma Doon Road) (**Figure 7.24**), which is located on the edge of this LCT.

7.6.74 There are no wind farms located within this LCT, but there is an influence from some distant wind farm development across a few elevated locations as illustrated by cumulative ZTV **Figures 7.13a-g**.

Sensitivity

7.6.75 The Lowland Hills – Central LCT has a high-medium value. The LCT lies within the Denny Hills LLA, and while the land-use pattern of this landscape unit is characterised by a mixture of commercial forestry and open moorland, it forms a contrasting landscape to neighbouring areas to the east and south. As a result, it provides some scenic value but only limited recreational value. The absence of stronger naturalness qualities and its local level landscape designation preclude the highest value being attributed to the LCT.

7.6.76 The Lowland Hills – Central LCT generally has a medium susceptibility to the Proposed Development, although it varies slightly across its extents. Overall, the character of the relatively simple landscape, which contains some scattered development, and the existing influence of nearby operational wind farms reduces the LCT's susceptibility to wind farm development to a degree. However, its medium scale and its contribution to the setting of the surrounding lowlands, slightly increases its susceptibility to large scale wind farm development.

7.6.77 The combination of the value of the landscape and its susceptibility to the Proposed Development leads to an overall **high-medium** rating for sensitivity.

Magnitude of Change

7.6.78 The Proposed Development is located outwith the LCT unit and there would therefore be no direct effects upon its character. Effects of the Proposed Development would therefore be indirect and associated with its influence on its surrounding landscape.

7.6.79 Theoretical visibility of the Proposed Development is contained to the north-west facing slopes of Darrach Hill and Denny Muir at distances of approximately 4-6km. A large proportion of this potentially affected area to the west and south-west of Darrach Hill is covered by commercial forestry and as a result possesses a strong degree of enclosure. The overall area of this small LCT unit that is susceptible to effects from the Proposed Development is therefore small.



- 7.6.80 Factors that increase the magnitude of change are:
- Areas of theoretical visibility predicted across the LCT unit at distances of between 2-4km;
 - The north-western aspect of the potentially affected areas;
 - The large scale of the proposed wind turbines and the permanent anemometer mast;
 - The increase in the influence of wind farms to the north west of the LCT unit;
 - The larger vertical scale of the proposed wind turbines relative to other operational wind farms within the LCT, such as Earlsburn and Craigengelt; and
 - The felling of forestry associated with the Proposed Development.
- 7.6.81 Factors that moderate the magnitude of change are:
- The small extent of the area that could be affected by the Proposed Development;
 - The relatively small number of wind turbines proposed which would limit the extent of direct effects on the LCT;
 - The relatively compact form of the Proposed Development which would occupy a relatively narrow horizontal angle of the landscape;
 - Some intervening landform screening of turbine towers is predicted;
 - The location of the Proposed Development within an area of the LCT that has been modified by commercial forestry; and
 - The Proposed Development is not an entirely new characteristic influence from some of the affected parts of this LCT unit.
- 7.6.82 Taking these factors into account, the magnitude of change across open parts of the LCT unit where theoretical visibility is predicted would be low, with the magnitude of change reducing to negligible or low where enclosure is provided by commercial forestry. Outwith these affected areas, there would be no theoretical visibility and consequently no change to the character of the landscape.

Significance of Effect

- 7.6.83 The effects of the Proposed Development on the landscape character of the Lowland Hills – Central LCT where theoretical visibility is predicted to be highest would be at worst **moderate-minor** and **not significant** where visibility isn't interrupted by the enclosure provided by commercial forestry, where commercial forestry is present effects would reduce to either a **negligible** level or **no effect**, and across all other parts of the LCT there would be **no effect** due to the absence of visibility.

Cumulative Assessment

- 7.6.84 In relation to the consented cumulative scenario, there is theoretical visibility of the consented Shelloch and Earlsburn Extension wind farms predicted on north facing slopes and summits across the north-western half of the LCT unit. The introduction of these consented developments would intensify the characteristic influence of wind farms within the hills to the north west of the LCT unit in part by reducing the separation between Earlsburn and Craigengelt Wind Farms and also by increasing the arc of wind farm development to the north west of the LCT unit. The Proposed Development would also be situated to the north west of the LCT unit beyond



- Carron Valley, but closer, and as a consequence it would further intensify this characteristic of the wider landscape. The closer location of the Proposed Development would increase the cumulative magnitude of change by bringing wind farm development closer to the LCT unit. The enclosure provided by the conifer forestry on part of the hill slopes would moderate these effects. A **high-medium** cumulative magnitude of change would therefore arise across affected areas outwith the conifer forestry plantation.
- 7.6.85 In relation to the application-stage cumulative scenario, the Drummarnock Wind Farm application would also be visible across similar parts of the LCT unit to Shelloch and Earlsburn Extension wind farms, and would be apparent close to the operational Craigengelt Wind Farm, extending the arc of wind farms further to the north-east. The Drummarnock Wind Farm application would therefore further intensify the cumulative influence of wind farms to the north of the LCT unit. The cumulative effects of the Proposed Development in this scenario would therefore be relatively similar to those predicted in the consented cumulative scenario due to the similar pattern of wind farm development in the wider landscape. The cumulative magnitude of change would therefore remain at a **high-medium** level in the consented cumulative scenario.
- 7.6.86 In summary, the Proposed Development would result in **major-moderate** and **significant** cumulative effects in the consented and application-stage cumulative scenarios where there is no enclosure from the extensive conifer forestry. Where extensive conifer forestry is present, it is likely that effects would be lower and **not significant**.

2. Rolling Valley Farmland - Middle Endrick Water LCT

Baseline

- 7.6.87 The Middle Endrick Water unit of the Rolling Valley Farmland LCT encompasses the valley floor and lower slopes of the valley associated with the Endrick Water that lie between Boquhan in the west and Craigton in the east, and also the very southern reaches of the valley associated with the Lernock Burn, near Campsie Glen Holiday Park. This part of the Endrick Water valley is situated approximately 4km to the west of the Proposed Development, and it extends to approximately 10km in length.
- 7.6.88 The following characteristics of this LCT have been extracted from Stirling Council's Draft Supplementary Guidance: Landscape Character Assessment:

"As the Endrick Water leaves the hills its valley is tightly contained by the high masses of the Fintry Hills to the north and the Campsie Fells to the south. Beyond the bridging point at Fintry the valley gradually opens out – as the precipitous outer edges of the Fintry Hills give way to a lower moorland plateau in the north and spreading foot slopes separate the valley from the high corries and scarps of the Campsie Fells to the south. A further change occurs as the river approaches the bridging point below Balfroon, and the valley again becomes pinched between higher land.

South of Fintry, the narrow valley floor with its smooth grass fields and riparian trees contrasts strongly with the closely encroaching, roughly textured hill slopes, with their assortment of rock outcrops, bracken and moorland. Nearer to Fintry the steep valley sides are patterned with woodland and the estate policies of Culcreuch Castle. This upper part of the valley lies within a local landscape designation, the Southern Hills Local Landscape Area.



From Fintry to Endrick Bridge the small, strongly meandering river runs across a near-flat valley floor, occasionally broken by gentle undulations and enclosed by steeply rolling valley slopes. Many streams run from the surrounding high land across these slopes to merge with the Endrick Water. The pastureland of the valley floor is patterned by a variety of clipped or tall beech or hawthorn hedgerows and fences, or occasional drystone walling. Trees and woodlands make a positive contribution in the form of mature deciduous avenue and roadside trees; curvilinear shelterbelts; copses and thickets of trees hugging dwellings; streamside fringes; and mixed and broad-leaved semi-natural woodlands of ash, beech and oak. Woodland cover is especially marked in the vicinity of Ballikinrain, where there are a number of old policy and parkland landscapes. To the north of the valley, where it merges with the higher open plateau of Kippen/ Ballindalloch Muir, woods are less common but small patches of birch and conifers, and hawthorn and gorse hedges occur.

The Endrick Water itself is a Site of Special Scientific Interest and a Special Area of Conservation for lampreys.

The valley is a route corridor for the locally important B822 and B818 roads; in addition a minor road runs on the north side of the valley, just below Ballindalloch Muir.

Views within the landscape are predominantly channeled along the river floodplain or valley sides, restricted and dominated by the surrounding hills and moorland plateau. Dramatic views to crags and corries on Fintry and Campsie Hills. Important views into the landscape on descending from higher ground on the B822."

- 7.6.89 The characteristics of the LCT are also illustrated in the visualisations for Viewpoint 10 (B822, south-east of Fintry) (**Figure 7.26**), which is located in this LCT.
- 7.6.90 There are no wind farms located within this LCT and there is also very limited influence from wind energy development, as illustrated by cumulative ZTV **Figures 7.13a-g**.

Sensitivity

- 7.6.91 The Middle Endrick Water unit of the Rolling Valley Farmland LCT has a medium to high-medium value. Eastern parts of the LCT are covered by the Southern Hills LLA, while western parts that lie at the foot of the Campsie Fells are not covered by a landscape designation. The landscape is settled and as a result its naturalness is reduced, but it generally possesses a traditional character that is influenced by the historic estates of the area. Overall, the level of recent development within the valley and its local level landscape designation, preclude a higher value being attributed to the LCT.
- 7.6.92 The Middle Endrick Water unit of the Rolling Valley Farmland LCT generally has a high susceptibility to the Proposed Development. There is currently no existing influence from wind farm development across the LCT, and it is likely that it would contrast with the more traditional landscape character of the valley, including its smaller scale. The surrounding hills form prominent skylines, and this would further increase the susceptibility of this LCT to the Proposed Development.
- 7.6.93 The combination of the value of the landscape and its susceptibility to the Proposed Development leads to an overall **high-medium** rating for sensitivity.



Magnitude of Change

- 7.6.94 The Proposed Development is located outwith the LCT unit and there would therefore be no direct effects upon its character. Effects of the Proposed Development would therefore be indirect and associated with its influence on its surrounding landscape.
- 7.6.95 **Figure 7.9** shows a relatively narrow shard of theoretical visibility that extends through the valley from Fintry in the east to Balfroon in the west at distances of between 5-15km. The limited parts of the LCT unit that may be affected would experience theoretical visibility of varying numbers of turbines with considerable landform screening to parts of the towers and blades. While there is some enclosure from riparian woodlands close to the Endrick Water, the agricultural fields that characterise the valley slopes tend to have a more open character with the Fintry Hills contributing to the wider setting of these parts of the LCT unit. Theoretical visibility is not predicted across large parts of the LCT unit to the north and north-west of Fintry and across the south-west of the LCT unit around Boquhan Glen.
- 7.6.96 Factors that increase the magnitude of change are:
- The relatively widespread theoretical visibility that is predicted across some central parts of the LCT unit;
 - The small to medium scale of the LCT unit;
 - The introduction of wind turbines and the permanent anemometer mast on to the ridgeline between the distinctive crags of the Fintry Hills and Campsie Fells, which is currently unaffected by operational wind farm development;
 - The slight contrast between the wind turbines and the traditional estate character of the valley landscape and the undeveloped upland landscape;
 - Views are often channelled along the valley towards the Site of the Proposed Development.
- 7.6.97 Factors that moderate the magnitude of change are:
- The relatively small number of wind turbines proposed;
 - The relatively compact form of the Proposed Development which would occupy a relatively narrow horizontal angle of the landscape;
 - The medium to large separation distances between the proposed turbines and the potentially affected parts of the LCT unit;
 - Some intervening landform screening of turbines and their towers would be experienced across the majority of the LCT unit;
 - Enclosure from riparian woodland; and
 - The proposed wind turbines would appear to be situated within a larger scale upland landscape.
- 7.6.98 Taking these factors into account, the magnitude of change upon this LCT would generally be **low** across all affected areas of the LCT unit, and there would be **no change** from the large parts where theoretical visibility is not predicted to arise.

Significance of Effect

- 7.6.99 The effect of the Proposed Development on the landscape character of the Middle Endrick Water unit of the Rolling Valley Farmland LCT unit where theoretical visibility is predicted would be at worst **moderate-minor** and **not significant**, and across all other parts of the LCT unit there would be **no effects**.



Cumulative Assessment

- 7.6.100 In relation to the consented cumulative scenario, there is only some very limited theoretical visibility of the consented Shelloch Wind Farm across small areas of the south east and west of the LCT unit. The Shelloch wind turbines would have a very minor influence on the character of the LCT due to visibility being limited to wind turbine blades. As a result, the cumulative interaction between the consented Shelloch wind turbines and the Proposed Development would be weak, and the cumulative magnitude of change would be **negligible**.
- 7.6.101 In relation to the application-stage cumulative scenario, there is only some very limited theoretical visibility of the Drummarnock Wind Farm proposal across a small area of the south east of the LCT unit. The Drummarnock wind turbines would have a very minor influence on the character of the LCT due to visibility being limited to wind turbine blades. As a result, the cumulative interaction between the Drummarnock wind turbines and the Proposed Development would be weak, and the cumulative magnitude of change would remain **negligible**.
- 7.6.102 In summary, the Proposed Development would result in **minor** and **not significant** cumulative effects in the consented and application-stage cumulative scenarios.

2. Rolling Valley Farmland - Lower Endrick Water LCT

Baseline

- 7.6.103 The Lower Endrick Water unit of the Rolling Valley Farmland LCT is situated approximately 14km to the west of the Proposed Development. It encompasses an area of farmland around Killearn, which spans from Croftamie in the west to Balfron in the east, and Dumgoyne in the south to Balfron Station in the north.
- 7.6.104 The following characteristics of this LCT have been extracted from Stirling Council's Draft Supplementary Guidance: Landscape Character Assessment:

"The valley of the Endrick Water west of Balfron opens out and the sloping the valley sides are overlaid by a complex pattern of ridged and rounded landforms, which largely hide the course of the river. These hummocky features are formed by glacial deposits and are important for our understanding of the glacial history and associated landscape change in this part of Scotland. The western section of this character area contains features of national importance, designated as a Geological Conservation Review Site.

The varied orientation of the deposits has a strong influence on how the landscape is experienced at a local level. North-west and west of Gartness the main features are long moraine ridges, on a roughly north/ south axis. North-east and east of the Gartness, either side of the river and on the rising ground towards Balfron and Killearn, clusters of rounded, hummocky drumlins are generally orientated east to west. The Endrick Water and a few minor tributaries meander around and occasionally cut through these features. The Endrick Water itself is a Site of Special Scientific Interest and a Special Area of Conservation for lampreys.

Land-use is predominantly agricultural. Post-and-wire fencing divides the fields of pastureland; internal hedgerows occur, but are not common except in a few localised areas - similarly with sandstone walls. In contrast the edges of many minor roads and tracks are edged by neatly clipped beech or hawthorn hedges. Field and lane boundaries are liberally sprinkled with broad-leaved trees.

West of the A81 woodland cover is very localised but to the east of the trunk road the farmland is broken up by numerous coniferous or deciduous shelterbelts, lines



of birch, ash and oak woodland edging some of the watercourses and policy landscapes. Several small woodlands west of Killearn are designated as Sites of Special Scientific interest and form part of a small network of functionally connected woodland habitats.

The northern, eastern and southern boundaries of this character area are broadly defined by the A811, A875 and B834, whilst the busy A81 runs roughly north to south through the middle. A number of other minor roads and tracks wind through the landscape, some forming core or countryside paths. It is still possible to discern the line of a dismantled railway line curving through the rolling landform, part of which now forms a section of the West Highland Way.

Within the strongly rolling and well-treed landscape views are alternately contained and open. On rising ground and ridges some wide views are possible - to the craggy face of the Campsie Fells and hills to the north as well as the glinting, twisting meanders of the Endrick Water near Drymen, alternating with more localised views within the lower dips. Key views into and across this landscape are from the surrounding higher ground."

- 7.6.105 There are no wind farms located within this LCT and there is also very limited influence from wind energy development, as illustrated by cumulative ZTV **Figures 7.13a-g**.

Sensitivity

- 7.6.106 The Lower Endrick Water unit of the Rolling Valley Farmland LCT has a medium-low value. The LCT does not form part of designated landscape, and it possesses a relatively modest level of scenic quality. The land-use pattern of the landscape is heavily influenced by agriculture, with gently undulating agricultural fields often bordered by deciduous woodland shelterbelts and hedgerows. Overall, the landcover is relatively consistent, with the exception of the settlements of Killearn and Balfron which form more heavily settled foci. As a result, the LCT possesses relatively weak characteristics that are not representative of a particularly distinctive landscape.
- 7.6.107 The Lower Endrick Water unit of the Rolling Valley Farmland LCT generally has a high-medium susceptibility to the Proposed Development, although it varies slightly across its extents. The character of the medium scale landscape is relatively man-modified and this slightly reduces its susceptibility to the Proposed Development. However, the smaller scale patterns associated with the landcover of agricultural fields and settlement reduce this susceptibility slightly.
- 7.6.108 The combination of the value of the landscape and its susceptibility to the Proposed Development leads to an overall **medium** rating for sensitivity.

Magnitude of Change

- 7.6.109 The Proposed Development is located outwith the LCT unit and there would therefore be no direct effects upon its character. Effects of the Proposed Development would therefore be indirect and associated with its influence on its surrounding landscape.
- 7.6.110 Theoretical visibility of the Proposed Development is relatively widespread across the rural landscape to the south west of Balfron at distances of 13-20km, albeit varying numbers and portions of the turbines are predicted to be visible due to the locally undulating landform. Given the presence of some woodland across the LCT unit and the more modest scale of the landform undulations, in reality this woodland is likely to interrupt or screen visibility of the turbines from some areas.



- 7.6.111 Factors that increase the magnitude of change are:
- The relatively widespread theoretical visibility that is predicted across some central parts of the LCT unit;
 - The small to medium scale of the LCT unit;
 - The introduction of wind turbines and the permanent anemometer mast on to the ridgeline between the distinctive crags of the Fintry Hills and Campsie Fells, which is currently unaffected by operational wind farm development;
 - The slight contrast between the wind turbines and the traditional estate character of the valley landscape and the undeveloped upland landscape;
 - Views are often channelled along the valley towards the Site of the Proposed Development.
- 7.6.112 Factors that moderate the magnitude of change are:
- The relatively small number of wind turbines proposed;
 - The relatively compact form of the Proposed Development which would occupy a relatively narrow horizontal angle of the landscape;
 - The medium to large separation distances between the proposed turbines and the potentially affected parts of the LCT unit;
 - Some intervening landform screening of turbines and their towers would be experienced across the majority of the LCT unit;
 - Enclosure from riparian woodland; and
 - The proposed wind turbines would appear to be situated within a larger scale upland landscape.
- 7.6.113 Taking these factors into account, the magnitude of change upon this LCT would generally be **low** across all affected areas of the LCT unit, and there would be **no change** from the large parts where theoretical visibility is not predicted to arise.

Significance of Effect

- 7.6.114 The effect of the Proposed Development on the landscape character of the Lower Endrick Water unit of the Rolling Valley Farmland LCT unit where theoretical visibility is predicted would be at worst **moderate-minor** and **not significant**, and across all other parts of the LCT unit there would be **no effects**.

Cumulative Assessment

- 7.6.115 In relation to the consented cumulative scenario, there is some distant theoretical visibility predicted of the consented Shelloch wind farm across the rolling farmland to the north and north west of Killearn. The Shelloch wind turbines would have a very minor influence on the character of the LCT due to visibility being limited to wind turbine blades. As a result, the cumulative interaction between the Shelloch wind turbines and the Proposed Development would be weak, and the cumulative magnitude of change would be **negligible**.
- 7.6.116 There is no theoretical visibility of application-stage cumulative wind farms in this view, and there would therefore be no change to the cumulative effects predicted in the consented cumulative scenario.
- 7.6.117 In summary, the Proposed Development would result in **minor** and **not significant** cumulative effects in the consented and application-stage cumulative scenarios.



Assessment of Effects on Landscape Designations

- 7.6.118 The assessment of effects on landscape designations is based on the effect that the Proposed Development may have on their 'Special Landscape Qualities' (or 'SLQs'). This is a separate assessment from that of the likely effects on landscape character.
- 7.6.119 The Scoping Report (section 6.8.3) and the subsequent preliminary assessment of landscape designations in this chapter (section 7.4) identified the Southern Hills LLA (0km), Kilsyth Hills SLA (1km), Denny Hills SLA (3km), Campsie Fells LLA (3km) as the only landscape planning designations which have potential to be significantly affected as a result of the Proposed Development. The effect on these landscape planning designations is assessed below. The other designated areas that cover the Study Area were found through the scoping process and subsequent field and desk studies and consultation to not have the potential to be significantly affected and have therefore not been assessed in any further detail.

Southern Hills LLA

Baseline

- 7.6.120 The Southern Hills LLA is located immediately to the south-west of Stirling, approximately 4km north of Kilsyth, approximately 2km to the east of Balfron, and immediately to the south of Kippen. The LLA covers a relatively large area of Stirling extending approximately 28km between Killearn in the west and Stirling in the east, and approximately 14km between Kippen in the north and the Kilsyth Hills in the south. The Proposed Development is located slightly to the south of the centre of the LLA, which is located around Cringate Law.

- 7.6.121 The citation in Stirling Council's Draft Supplementary Guidance (2019) provides the following overview in relation to the LLA:

"This large LLA comprises the southern hill mass and associated valley and upland fringe landscapes that separate the Carse of Stirling from the populous Glasgow-Falkirk corridor. Although some of the landscapes are physically and visually divorced from one another they all defined by their important contribution to the character and impact of the Southern Hills as a whole. All areas are equally important to the overall experience and appreciation of the LLA. The distinct landscapes comprising the LLA are:

- *Hills:*
 - *The Campsie Fells*
 - *The Fintry, Gargunnock and Touch Hills.*
- *Valleys:*
 - *Upper Carron Valley*
 - *Middle Endrick Valley, from Low Bridge in the south to the bridge at Honeyholm*
- *Hill Fringes:*
 - *Kippen Muir"*

- 7.6.122 The broader characteristics of the LLA are illustrated in the visualisations for Viewpoint 1 (Sir John de Graham's Castle) (**Figure 7.17**), Viewpoint 2 (Carron



Valley Reservoir Long Distance Path) (**Figure 7.18**), Viewpoint 3 (Carron Valley Forestry Commission Car Park) (**Figure 7.19**), Viewpoint 4 (Carron Valley Reservoir Shore Trail) (**Figure 7.20**), Viewpoint 5 (Minor road, near Easter Cringate Cottage) (**Figure 7.21**), Viewpoint 7 (Meikle Bin) (**Figure 7.23**), Viewpoint 9 (Minor Road, near Easter Buckieburn) (**Figure 7.25**), Viewpoint 10 (B822/ B818, south-east of Fintry) (**Figure 7.26**), Viewpoint 11 (Stronend) (**Figure 7.27**) and Viewpoint 12 (Earl's Seat) (**Figure 7.28**).

- 7.6.123 Stirling Council's citation also includes a description of the five 'special qualities' of the LLA. **Table 7-9** lists these special qualities and separately considers whether or not the Proposed Development could potentially have a significant effect upon them.

Sensitivity

- 7.6.124 The Southern Hills LLA has a high-medium value. This value is attributed to its local level designation in Stirling and its relatively high scenic quality despite the influence of some wind farm development.
- 7.6.125 The Southern Hills LLA has a low to high susceptibility to the Proposed Development, which varies as a result of the different scale and character of the different parts of the LLA. For example, the LLA has a lower susceptibility across its larger scale interior, in particular where there are existing influences from operational wind farm development, and a higher susceptibility within the smaller scale valleys, such as that associated with the Middle Endrick Water, and its edges, which form skylines and backdrops for the surrounding lowlands. Overall, the LLA's susceptibility to the Proposed Development is considered to be medium.
- 7.6.126 The combination of the LLA's high-medium value and its medium susceptibility to change results in a **high-medium** sensitivity for the Southern Hills LLA.

Magnitude of Change

- 7.6.127 The blade tip ZTV (**Figures 7.10a-b**) shows that theoretical visibility would be widespread across Carron Valley and central parts of the LLA, with more intermittent theoretical visibility predicted across the Fintry Hills, Gargunnock Hills, Gonachan Glen, Campsie Muir, and eastern parts of the LLA. While there would be some scattered small, distant, elevated areas closer to the edges of the LLA that are also predicted to receive theoretical visibility of the Proposed Development.
- 7.6.128 Further analysis in relation to the effect that this visibility of the Proposed Development would have on the LLA's SLQs is provided below in **Table 7-9**.

Table 7-9: Special Qualities of the Southern Hills LLA

Special Quality	Magnitude of Change
<i>"Diversity of landscape experience"</i> <i>Contrast between large scale, simple open hill land and smaller scale, diverse, farmed, wooded and settled hill fringes – with areas such as Kippen Muir and the Carron Valley being transitional between the two.</i> <i>Contrast between expansive views from hill summits and edges with enclosure and introspection within the valleys and parts of the hill fringes.</i>	The Proposed Development is theoretically visible from across Carron Valley, but it would not be visible from Kippen Muir. The Proposed Development would bring wind farm development closer to Carron Valley and as a result it would increase the effects of wind farm development upon its more modest scale (relative to the larger scale open hill ground surrounding it). The position of the turbines just beyond the threshold of the valley would moderate these effects, but their large scale and close proximity to the valley would increase the magnitude of change. Overall, a high magnitude of change is predicted to arise



Special Quality	Magnitude of Change
<i>Large-scale forestry management and wind energy developments have created localised areas of marked change in landscape character and experience."</i>	upon the aspect of this SLQ that relates to Carron Valley, with no effect arising upon the part of the SLQ that relates to Kippen Muir.
<i>"Striking views</i> <i>Panoramic outward views from the hill edges and summits and Kippen Muir.</i> <i>Locally important and dramatic views descending into the Endrick Valley from Kippen Muir and the Campsie Fells; to and from Lewis Hill/Sauchie Craigs and passing close to the Earlsburn and Craigengelt Wind Farms.</i> <i>Views towards the LLA are equally important - from surrounding lowland and settlements, key viewpoints in and around Stirling and the edges of the national park. The skylines and outer faces of the hills help to define Strath Blane, the Carse of Stirling and contribute to the setting of Stirling itself."</i>	The Proposed Development would have no impacts upon the panoramic views out of the LLA, and it would therefore have no effect upon this aspect of the SLQ. Visibility of the proposed turbines would be experienced from parts of the smaller scale, enclosed Endrick Valley landscape, where a low magnitude of change would occur to views (such as Viewpoint 10). The wind turbines would not however affect the ability to appreciate its 'hidden quality' when <i>"descending into the Endrick Valley from Kippen Muir and the Campsie Fells"</i>. While the Proposed Development would not be visible in views of Lewis Hill and Sauchie Craigs, it would be visible in the context of the operational Craigengelt Wind Farm, where it would integrate cohesively with the existing wind farm. A low magnitude of change is therefore predicted upon this aspect of the SLQ. The Proposed Development would have a relatively modest influence upon views towards the LLA, particularly from settled areas to the north and north-west of the LLA. Where visible from around Stirling, the proposed turbines would be largely screened by landform and generally seen within the context of the operational Craigengelt Wind Farm. As a result, a low magnitude of change would arise upon this aspect of the SLQ.
<i>"Hills</i> <i>Seemingly towering hills defining and confining adjacent lowland and conveying a strong sense of a physical barrier.</i> <i>Precipitous west and north facing slopes appear much higher and larger than they really are because of lack of scale indicators. Distinctive and dramatic rock outcrops and corrie landforms appear unassailable.</i> <i>Perceived scale of the hills has diminished somewhat in the east, where large turbines at Craigengelt belie the seeming height of the hill mass.</i> <i>A sense of remoteness and isolation</i> <i>The core, largely uninhabited, simple, large-scale landscapes still convey a sense of remoteness - despite proximity of the whole hill mass to</i>	The Proposed Development would rarely be visible in the context of the <i>"Precipitous west and north facing slopes..."</i> of the LLA, apart from intermittently around the Balfron and Balfron Station area, and as a result the addition of the proposed turbines would result in a low magnitude of change upon this aspect of the SLQ. The Proposed Development's relatively close association with Craigengelt Wind Farm would moderate its effects upon the perceived scale of the hills across the LLA. Although there are certain parts of the LLA, such as areas of Carron Valley and the Endrick Valley, where operational wind farms have a limited influence, and as a result the introduction of large-scale turbines would alter the way in which the scale of these hills is perceived. A medium magnitude of change would arise upon this aspect of the SLQ across parts of these valleys. The situation of the Proposed Development within an area of commercial forestry, close to the existing road network, moderates its influence



Special Quality	Magnitude of Change
<i>major settlements and the presence of wind turbines.”</i>	upon the wider wildness qualities of the LLA. As a result, a low magnitude of change would arise upon this SLQ.
“Valleys <i>Both valleys have a hidden, secluded quality, but are of contrasting scale and character.</i> <i>The Carron Valley in its scale and simplicity has more in common with the open hills than the little Endrick Valley to the north, a distinction emphasised by the changing patterns of timber harvesting and woodland cover compared with the apparent timelessness of the Middle Endrick landscape.</i> <i>Middle Endrick Valley is a sheltered, productive and human- scale landscape in marked contrast with the surrounding bleak hills and open moorland, the presence of which help define and reinforce the special sense of place. Its hidden quality is appreciated especially when approaching from higher land.”</i>	The Proposed Development would bring wind farm development slightly closer to Carron Valley and as a result it would increase the effects of wind turbines upon its more modest scale. The position of the turbines just beyond the threshold of the valley would moderate these effects, but their large scale and close proximity to the valley would increase the magnitude of change. A high magnitude of change is predicted to arise upon the aspect of this SLQ that relates to Carron Valley. Visibility of the proposed turbines would be experienced from parts of the smaller scale, enclosed Endrick Valley landscape, where a low magnitude of change would occur to views (such as Viewpoint 10). The wind turbines would not however affect the ability to appreciate its ‘hidden quality’ when “<i>approaching from higher land</i>”.
“Hill Fringes <i>Transitional landscapes of varied scale and character.</i> <u>Kippen Muir</u> <i>Sense of exposure and isolation.</i> <i>Elevated position, open moorland character and panoramic views with big skies convey a sense of exposure, only marginally off-set by the shelter offered from the Fintry Hills.</i> <i>A sense of remoteness persists, despite the relatively small extent of the muir.</i> <u>East Touch Fringe and Kippen/ Gargunnock Fringe</u> <i>Richly patterned and diverse landscapes with a changing sense of prospect and shelter.</i> <i>Prosperous, well tended and human-scale landscapes with a strong historic tradition of settlement.</i> <i>Rich diversity of tree cover, which combined with rolling landform create pockets of sheltered land with a sense of seclusion.”</i>	There is no theoretical visibility of the Proposed Development across Kippen Muir and the East Touch and Kippen/ Gargunnock Fringes, so the Proposed Development would have no change upon this SLQ.



Significance of Effect

- 7.6.129 In summary, effects of up to a **major-moderate** and **major** level that would be **significant** are predicted upon three of the LLA's SLQs relating to "*Diversity of landscape experience...*", "*Hills...*" and "*Valleys...*", which would be experienced primarily across large areas of Carron Valley. Effects upon other aspects of the SLQs would be of a **moderate-minor or lower** level, and as a consequence they would be **not significant**.

Integrity of the SLA

- 7.6.130 It is relevant to conclude as to the effect of the Proposed Development on the LLA in relation to NPF4 (Policy 4), which states:

"(d) Development proposals that affect a site designated as a local nature conservation site or landscape area in the LDP will only be supported where:

- (i) Development will not have significant adverse effects on the integrity of the area or the qualities for which it has been identified; or*
- (ii) Any significant adverse effects on the integrity of the area are clearly outweighed by social, environmental or economic benefits of at least local importance."*

- 7.6.131 In these terms, it is considered that the Proposed Development would have "...significant adverse effects on the integrity of the area or the qualities for which it [the Southern Hills LLA] has been identified". Specifically, the Proposed Development would have a significant effect on aspects of three of the LLA's SLQs.

- 7.6.132 It should, however, be noted that theoretical visibility of the Proposed Development from the LLA is variable, as described above, and parts of the LLA would gain no, negligible, or low visibility and influence of the Proposed Development. This ensures that while the Proposed Development would have "...significant adverse effects on the..... qualities for which it [the Southern Hills LLA] has been identified", the magnitude and geographical impact of these significant effects would be localised and not sufficient to undermine the integrity of the designation.

Kilsyth Hills SLA

Baseline

- 7.6.133 The Kilsyth Hills SLA encompasses a relatively small area of North Lanarkshire between Carron Valley Reservoir in the north and Kilsyth in the south, and Carron Bridge in the east and the Campsie Fells in the west. The Proposed Development is located approximately 1km to the north of the SLA.

- 7.6.134 Paragraphs 6.3-6.6 of the citation in North Lanarkshire Council's 'Statement of Landscape Importance for the Kilsyth Hills Special Landscape Area Background Report' (2018) provides the following overview in relation to the SLA:

"Rising steeply to the north from the Kelvin Valley, the hills create both a physical and visual enclosure for the north of North Lanarkshire. A ridge running west-east bisects the hills; to the south of this ridge is open moorland where wide panoramic views over most of North Lanarkshire are available. North of the ridge the land slopes gradually downwards into the Carron Valley. In contrast north facing slopes are heavily wooded mainly with historic Forestry Commission conifer plantations resulting in an increased sense of enclosure. The undeveloped and remote character of the hills provides a highly valued contrasting backdrop to the adjacent



landscape units and settlements such as those in the Kelvin Valley and the more distant Glasgow and Clyde Valley conurbation.

The Kilsyth Hills lie along the northern boundary of North Lanarkshire and extend into the Stirling Council area at some locations. They are part of a larger expanse of basalt geology overlain by moorland soils, which has eroded in places to expose the basalt rock. The landscape is characterised by undeveloped rounded hills with summits approximately between 400-600m, this is in contrast with the adjacent settled lowland Kelvin valley and rolling farmland. The highest points within the Kilsyth Hills are the summits of Tomtain (453m) and Garrell Hill (459m).

There is archaeological evidence of historic settlement on many of the summits along the ridgeline. However at present there is very limited development on the hills, with the exception of the forestry plantations that, with the exception of a large plantation area to the north of Banton, are restricted to the north of the ridge. Other than these plantations, development is restricted to a largely single track road running north from Kilsyth, the “TakMa-Doon Road”, forestry tracks, an overhead power line along the lower slopes and occasional farms that are generally on the lower slopes.

This very limited scale of development has resulted in the south facing areas of the landscape having a strong sense of openness and exposure particularly on the upper slopes. This character provides a contrasting background to the adjacent landscape character areas and settlements, and as such is viewed as a highly valued landscape.”

- 7.6.135 The broader characteristics of the SLA are illustrated in the visualisations for Viewpoint 3 (Carron Valley Forestry Commission Car Park) (**Figure 7.19**), Viewpoint 4 (Carron Valley Reservoir Shore Trail) (**Figure 7.20**), Viewpoint 6 (Tomain) (**Figure 7.22**), and Viewpoint 8 (Tak Ma Doon Road) (**Figure 7.24**).
- 7.6.136 North Lanarkshire Council's citation also includes a description of the three 'special qualities' of the SLA. **Table 7-10** lists these special qualities and separately considers whether or not the Proposed Development could potentially have a significant effect upon them.

Sensitivity

- 7.6.137 The Kilsyth Hills SLA has a high-medium value. This value is attributed to its local level designation in Stirling and its relatively high scenic quality despite the influence from nearby settlements and wind farm developments.
- 7.6.138 The Kilsyth Hills SLA generally has a high-medium susceptibility to the Proposed Development, although it varies slightly across its extents. On the whole, the openness, large scale and occasional telecommunication masts slightly reduce the susceptibility of the landscape, but its susceptibility is increased across the majority of areas where the generally undeveloped hills form backdrops and skylines to the surrounding lowlands.
- 7.6.139 The combination of the SLA's high-medium value and its high-medium susceptibility to change results in a **high-medium** sensitivity for the Kilsyth Hills SLA.

Magnitude of Change

- 7.6.140 The blade tip ZTV (**Figures 7.10a-b**) shows that theoretical visibility would be widespread across the northern slopes of the Kilsyth Hills and across some of the elevated hill summits, notably including Laird's Hill, Garrell Hill, and Tomtain. In reality, the visibility across the northern slopes of the hills beneath the summits



would be moderated by the enclosure that is provided by the commercial forestry. There would also be no theoretical visibility of the Proposed Development across the southern slopes of the Kilsyth Hills. More open views would be available from the shoreline of the Carron Valley Reservoir with representative views provided by Viewpoints 3 (Carron Valley Forestry Commission Car Park) and 4 (Carron Valley Reservoir Shore Trail).

- 7.6.141 Further analysis in relation to the effect that this visibility of the Proposed Development would have on the SLA's SLQs is provided below in **Table 7-10**.

Table 7-10: Special Qualities of the Kilsyth Hills SLA

Special Quality	Magnitude of Change
Diversity of views <i>"The distant views to the south and west include views towards Glasgow and the Firth of Clyde, whilst eastwards views extend over the Firth of Forth, the Forth Bridges and in the longer distance, Fife and to the north views are available over the Carron Valley to the Highlands beyond. There are also open views west along the hill ridge towards the summit of Meikle Bin and into the Campsie Fells."</i>	The Proposed Development would be visible from Laird's Hill, Garrell Hill, and Tomtain (see Viewpoint 6) in views to the north across Carron Valley, where it is likely to result in a medium magnitude of change upon these views. The Proposed Development would result in no change upon views from the LLA towards Glasgow, the Firth of Clyde, the Firth of Forth, and Fife, or views west along the hill ridge to Meikle Bin and the Campsie Fells.
Distinctive landform <i>"A distinctive feature is that whilst the Campsie Fells section of the rugged moorland hills has a long undulating ridgeline and a distinctive dramatic escarpment of south facing cliffs, the Kilsyth Hills have more accessible, more gently sloping southern slopes and a more undulating ridgeline. The distinctly recognisable tops gradually decrease in height eastwards towards the Denny Hills within the Falkirk local authority area. Smaller scale distinctive features within the Hills include a corrie and gorges at Corrie Burn and the Garrell Burn, with waterfalls and rocky outcrops on the side of Tomtain."</i>	The Proposed Development would result in no change to how this SLQ is perceived.
Recreational access <i>"The gently sloping nature of the southern slopes allows more accessible walking approaches to the Hills and the adjacent Campsie Fells from Kilsyth and Queenzieburn and the Tak Ma-Doon Road from the south and from the Carron Valley to the north."</i>	The Proposed Development would result in no change to the gently sloping nature of the southern slopes of the LLA, and as a result there would be no change to the recreational access to the hills. Nor would the Proposed Development affect the recreational access to the LLA from the Carron Valley to the north.

Significance of Effect

- 7.6.142 In summary, effects of up to a **moderate** level that would be **significant** are predicted upon one of the LLA's SLQs relating to *"Diversity of views..."*, which would be experienced from some elevated hill summits, such as Laird's Hill, Garrell Hill, and Tomtain. There would be **no effect** upon other aspects of the SLQs, and as a consequence they would be **not significant**.

Integrity of the SLA

- 7.6.143 In terms of NPF4 (Policy 4), it is considered that the Proposed Development would have *"...significant adverse effects on the integrity of the area or the qualities for*



which it [the Kilsyth Hills LLA] has been identified". Specifically, the Proposed Development would have a significant effect on an aspect of one of the LLA's SLQs.

- 7.6.144 It should, however, be noted that theoretical visibility of the Proposed Development from the LLA is variable, as described above, and parts of the LLA would gain no, negligible, or low visibility and influence of the Proposed Development. This ensures that while the Proposed Development would have "...significant adverse effects on the..... qualities for which it [the Kilsyth Hills LLA] has been identified", the magnitude and geographical impact of these significant effects would be localised and not sufficient to undermine the integrity of the designation.

Denny Hills LLA

Baseline

- 7.6.145 The Denny Hills LLA encompasses a relatively small area of Falkirk between Carron Bridge in the north west and Drumbowie Reservoir in the south east, and Loch Coulter Reservoir in the north and High Banton in the south. The Proposed Development is located approximately 4km to the south east of the LLA.

- 7.6.146 Paragraph 7.1 of the citation in Falkirk Council's 'SG09 Landscape Character Assessment and Landscape Designations' (2021) provides the following overview in relation to the LLA:

"Highly visually prominent area of lowland hills and hill fringes, forming the eastern edge of the Campsie/Kilsyth Hills range. This high ground together with the enclosed character of the Carron Valley and the relatively low level of development form a landscape of distinct character that is unique within Falkirk Council area. The area forms a strong contrast to the highly settled area on lower ground to the east and south."

- 7.6.147 The broader characteristics of the LLA are illustrated in the visualisations for Viewpoint 8 (Tak Ma Doon Road) (**Figure 7.24**).
- 7.6.148 Falkirk Council's citation also includes a description of the six 'special qualities' of the LLA. **Table 7-11** lists these special qualities and separately considers whether or not the Proposed Development could potentially have a significant effect upon them.

Sensitivity

- 7.6.149 The Denny Hills LLA has a high-medium value. This value is attributed to its local level designation in Falkirk and its relatively high scenic quality despite the influence of some wind farm development.
- 7.6.150 The Denny Hills LLA has a medium-low susceptibility to the Proposed Development, although it varies slightly across its extents. Overall, the character of the relatively simple landscape, which contains some scattered development, and the existing influence of nearby operational wind farms reduces the landscapes susceptibility to wind farm development to a degree. However, its medium scale and its contribution to the setting of the surrounding lowlands, slightly increases its susceptibility to large scale wind farm development.
- 7.6.151 The combination of the LLA's high-medium value and its medium-low susceptibility to change results in a **high-medium** sensitivity for the Denny Hills LLA.



Magnitude of Change

- 7.6.152 The blade tip ZTV (**Figures 7.10a-b**) shows that theoretical visibility of the Proposed Development is contained to the north west facing slopes of Darrach Hill and Denny Muir at distances of approximately 4-6km, and the slopes and edges of the River Carron valley at distances of 4-8km. A large proportion of this potentially affected area to the west and south-west of Darrach Hill is covered by commercial forestry and as a result possesses a strong degree of enclosure.
- 7.6.153 Further analysis in relation to the effect that this visibility of the Proposed Development would have on the LLA's SLQs is provided below in **Table 7-11**.

Table 7-11: Special Qualities of the Denny Hills LLA

Special Quality	Potential for the Proposed Development to significantly affect the Special Quality
<i>"Includes area of highest ground in Council area with locally distinct and diverse 'upland' and hill fringe character forming important western backdrop and setting to main settlements and a prominent area of hill land seen from majority of the lowland area of Falkirk Council area"</i>	The Proposed Development would be largely screened from the closest settlements across the lowland area to the east, and as such the magnitude of change to views of the LLA would generally be negligible at distances of approximately 10km, for example across settlements such as Denny. Theoretical visibility of the Proposed Development would increase with distance with the turbines visible beyond the LLA in the same context as the operational Craigengelt turbines; however, from large parts of the lowlands, for example across Larbert and Stenhousemuir, the turbines would be seen beyond the operational Tod Hill Wind Farm at closer range. Overall, it is considered that a low magnitude of change would arise upon this SLQ.
<i>"Limited development, forming strong contrast with developed lowland to south and east"</i>	The Proposed Development is not situated within the LLA and consequently it would not introduce development into the landscape. As described above, the turbines would be visible to varying degrees in the wider context of the LLA and this could lead to the perception from these areas that the wind turbines are situated in or close to the LLA. As a consequence, it is considered that a low magnitude of change would arise upon this SLQ.
<i>"Extensive panoramic views from minor roads and paths within area"</i>	Theoretical visibility of the Proposed Development is limited to one stretch of the B818 road, where visibility would be limited to blade tips at distances of 5-7km. The turbine blades would be viewed in the context of the operational Craigengelt Wind Farm, and as a consequence a negligible magnitude of change is predicted to this SLQ.
<i>"River Carron, with steep wooded slopes and gorge like character in eastern part of area and diverse vegetation cover along valley sides"</i>	The Proposed Development would result in no change to the <i>"steep wooded slopes and gorge like character"</i> and <i>"diverse vegetation cover"</i> of the River Carron valley.
<i>"Carron Valley, with B818 (Denny-Fintry) providing a scenic route through valley with</i>	While a comprehensive assessment of visual effects that would be experienced by road users of the B818 is provided in the detailed



Special Quality	Potential for the Proposed Development to significantly affect the Special Quality
<i>views from it of distinct 'upland' character, unique within Falkirk</i>	assessment of visual effects, only a very short section of this route passes through the LLA. As described earlier, only a negligible magnitude of change would arise upon views experienced by road users on sections of the B818 in the LLA.
<i>"Enclosed views along lower Carron Valley to valley sides with more open views from upper valley"</i>	Theoretical visibility of the Proposed Development would be very limited from the lower valley slopes, with some larger areas of visibility predicted across more elevated, open slopes to the north east of the river. Across these more elevated slopes, the wind turbines would be partially screened by landform, but where visible they would form a cohesive extension to the operational Craigengelt Wind Farm at distances of 6-8km. The magnitude of change upon this SLQ arising from the introduction of the Proposed Development would therefore be moderated to a low level.

Significance of Effect

7.6.154 In summary, effects of no greater than a **moderate-minor** level upon the SLQs would be experienced, and as a consequence they would be **not significant**.

Integrity of the SLA

7.6.155 In terms of NPF4 (Policy 4), it is considered that the Proposed Development would not have "...*significant adverse effects on the integrity of the area or the qualities for which it [the Denny Hills LLA] has been identified*".

Campsie Fells LLA

Baseline

- 7.6.156 The Campsie Fells LLA encompasses an area of East Dunbartonshire between Earl's Seat in the west and Meikle Bin in the east, and Clachan Campsie in the south and Holehead in the north. The Proposed Development is located approximately 3km to the north east of the LLA.
- 7.6.157 The LLA is characterised by the hills of Earl's Seat, Dumbreck, Hart Hill, Holehead, Lecket Hill and Cort-ma Law. The hills southern slopes are very steep in part, particularly to the north of Lennoxton, and above the Finglen Burn. There are two notable incisions into these hills associated with Campsie Glen and Fin Glen, which accommodate access routes into the interior of the LLA.
- 7.6.158 The broader characteristics of the SLA are illustrated in the visualisations for Viewpoint 12 (Earl's Seat) (**Figure 7.28**).
- 7.6.159 East Dunbartonshire Council's citation in their 'Natural Environment Planning Guidance' (2018) includes a description of the three 'special qualities' of the LLA. **Table 7-12** lists these special qualities and separately considers whether or not the Proposed Development could potentially have a significant effect upon them.



Sensitivity

- 7.6.160 The Campsie Fells LLA has a high-medium value. This value is attributed to its local level designation in East Dunbartonshire and its relatively high scenic quality despite the influence from nearby settlements and wind farm developments.
- 7.6.161 The Campsie Fells LLA generally has a high-medium susceptibility to the Proposed Development, although it varies slightly across its extents. On the whole, the openness and large scale slightly reduce the susceptibility of the landscape, but its susceptibility is increased across the majority of areas where the generally undeveloped hills form backdrops and skylines to the surrounding lowlands.
- 7.6.162 The combination of the SLA's high-medium value and its high-medium susceptibility to change results in a **high-medium** sensitivity for the Campsie Fells LLA.

Magnitude of Change

- 7.6.163 The blade tip ZTV (**Figures 7.10a-b**) shows that theoretical visibility of the Proposed Development is generally contained to the northern, central slopes of the LLA, as well as a few elevated hill summits, such as Earl's Seat, Inner Black Hill, Cort-ma Law, Holehead, and Lecket Hill.

Table 7-12: Special Qualities of the Campsie Fells LLA

Special Quality	Potential for the Proposed Development to significantly affect the Special Quality
<i>"Distinctive landform of the Campsie Fault</i> <i>The long undulating ridgeline of the seemingly towering Earl's Seat, Lairs and Cort Ma Law define and confine Clachan of Campsie, Lennoxton and Milton of Campsie conveying a strong sense of a physical barrier.</i> <i>The skylines and outer faces of the hills help to define the Glazert and Kelvin Valleys and contribute to the setting of East Dunbartonshire towns and villages and the Glasgow Conurbation.</i> <i>Precipitous distinctive and dramatic south facing escarpment cliffs and scree at the Crow Road and Meikle Reive, Lennoxton appear much higher and larger than they really are because of lack of scale indicators. The escarpment appears unassailable."</i>	The Proposed Development would not be visible from the settled lowlands to the south of the LLA, nor would it directly impact upon the character of these landforms, and as a consequence no change would arise upon the different aspects of this SLQ.
<i>"Striking views</i> <i>Panoramic outward views from the hill edges and summits: from Earl's Seat looking north west to the Loch Lomond and the Trossachs National Park, from Cort Ma Law and Lairs looking south and south west over the Glazert Valley LLA and south to the Kelvin valley and wider Glasgow area.</i> <i>The prevailing weather conditions are cloudy which results in periodically</i>	The Proposed Development would not affect the panoramic outward views <i>"from Earl's Seat looking north west to the Loch Lomond and the Trossachs National Park, from Cort Ma Law and Lairs looking south and south west over the Glazert Valley LLA and south to the Kelvin valley and wider Glasgow area."</i>, due to its situation to the north-east of the LLA. Nor would the Proposed Development affect views of the Glazert Valley from the Crow Road, or views towards the LLA <i>"from the lowland Glazert and Kelvin valleys, Clachan of Campsie, Lennoxton and Milton of Campsie, the Frontiers of the</i>



Special Quality	Potential for the Proposed Development to significantly affect the Special Quality
<i>dramatic changes in light across the hills;</i> • <i>Locally important and dramatic views descending into the Glazert Valley on the Crow Road.</i> • <i>Views towards the LLA are equally important, from the lowland Glazert and Kelvin valleys, Clachan of Campsie, Lennoxton and Milton of Campsie, the Frontiers of the Roman Empire (Antonine Wall) World Heritage Site, the Forth & Clyde Canal and John Muir Way."</i>	<i>Roman Empire (Antonine Wall) World Heritage Site, the Forth & Clyde Canal and John Muir Way". As a consequence no change would arise upon the different aspects of this SLQ.</i>
<i>"Diversity of landscape experience</i> • <i>Contrast between open and exposed rugged moorland on range of hills between Cort Ma Law and Earl's Seat with enclosure and introspection within the incised, steep sided valleys, of the Campsie Glen and the hidden Finglen, with their burns and waterfalls.</i> • <i>Contrast between the large scale, simple open hill land of the Campsie Fells and the adjacent landscapes, outwith the LLA, of the adjacent Glazert Valley LLA and Kelvin valley, of smaller scale, diverse, farmed, wooded and settled hill fringes.</i> • <i>The hills have a sense of remoteness yet are accessible to nearby urban areas and easy to walk or drive into the foothills then climb."</i>	The Proposed Development would not affect the contrast between the open hills and the enclosure of the Campsie Glen and Finglen, nor would it affect the contrast between the open hills and the smaller scale Glazert and Kelvin valleys. The Proposed Development has potential to affect the hill's sense of remoteness though due to it bringing wind farm development slightly closer to the LLA. On the slopes of Lecket Hill and Holehead at distances of between approximately 5-8km, the Proposed Development would have a medium-low magnitude of change upon this aspect of SLQ, while the magnitude of change would reduce to low across affected areas at greater distances, for example on the slopes of Earl's Seat.

Significance of Effect

- 7.6.164 In summary, effects of no greater than a **moderate** level upon the SLQs would be experienced, which in this instance would be **not significant** due to the existing influence of nearby operational wind farm development within a similar part of the LLA's setting.

Integrity of the SLA

- 7.6.165 In terms of NPF4 (Policy 4), it is considered that the Proposed Development would not have "...*significant adverse effects on the integrity of the area or the qualities for which it [the Campsie Fells LLA] has been identified*".

7.7 Assessment of Visual Effects

- 7.7.1 Effects on views are the changes to views that result from the introduction of the Proposed Development. The assessment of effects on views includes the 18 viewpoints which represent visibility of the Proposed Development, and effects on principal visual receptors such as settlements and routes. Cumulative effects are considered in the assessment.



- 7.7.2 The viewpoint locations are shown in conjunction with the ZTV on **Figures 7.6a-c**. The viewpoints are illustrated on **Figures 7.17-7.33** where a photograph of each view (with the exception of Viewpoint 16) is accompanied by a computer-generated wireline and a photomontage. The photographs and cumulative wirelines have a 90° field of view, whereas photomontages are presented with a 53.5° field of view. In the wirelines, the Proposed Development turbines are shown in red, operational wind farms are shown in black, under construction wind farms are shown in purple, consented wind farms are shown in green, and application wind farms are shown in blue.
- 7.7.3 Night-time photomontages that illustrate the theoretical visibility of 200cd light fittings on the wind turbine nacelles have also been included for four of the viewpoints: Viewpoint 5: Minor road near Easter Cringate Cottage (**Figure 7.17**), Viewpoint 9: Easter Buckieburn (**Figure 7.19**), Viewpoint 10: B822, south east of Fintry (**Figure 7.17**), and Viewpoint 13: Stirling Castle (**Figure 7.22**).
- 7.7.4 The assessment of night-time visual effects is based on clear night-time conditions, and on the use of 2,000cd and 200cd lights. In reality, it is unlikely that 2,000cd would be experienced at its full intensity as the 2000cd lights would only be in operation when visibility is less than 5km, and in this situation, they would appear less intense due to the poor visibility around the Proposed Development. The worst-case intensity experienced at viewpoints beyond 5km from the Proposed Development is therefore likely to be represented by the 200cd scenario. It is also important to remember that for the majority of visual receptors, the effect arising from aviation lighting is likely to be gained over a relatively short period. Views from within properties are likely to be restricted by the use of window coverings, particularly in winter, and properties within settlements are likely to be affected by baseline lighting of streetlights. As a result, people who experience views at night are frequently those using the road network, whose adaptation to darkness is compromised by dashboard and car headlights such that this group of receptors will not perceive the turbine lighting at its highest intensity. Remote rural locations, hilltops and footpaths are generally visited infrequently at night and the number of people affected would be low.

Assessment of Effects on Viewpoints

Viewpoint 1: Sir John de Graham's Castle

Baseline

- 7.7.5 This viewpoint, which is located by the remains of Sir John de Graham's Castle (or Dundaff Castle), is located less than 1km to the west of the proposed wind turbines. The castle is a Scheduled Ancient Monument, and while there is signage on the nearby minor road (and also in the forest closer to the remains), there are no publicised car parking facilities to encourage visitors. The remains of the castle take the form of a substantial square shaped ditch/moat, which contains a slightly raised rampart in the middle. The view towards the Proposed Development, oriented to the north east, is representative of one part of the panoramic views that can be experienced by visitors to the remains. These views have been temporarily improved following recent felling of the surrounding forestry.
- 7.7.6 The viewpoint is located within an area that is characterised by the Forested River Basin – Carron Valley LCT. Given the south-western aspect of the viewpoint, the principal views from this location are generally those of the Carron Valley, including the reservoir, which occupies the midground of the view to the south-west, south and south east. The largely forested, northern edges of the Kilsyth Hills and Campsie Fells form the backdrop to the reservoir. To the west, there are more far-



reaching views that are channelled down the Endrick Water valley in between the Campsie Fells and Fintry Hills. Views to the north are slightly obstructed by the mature forestry, but beyond these trees the Gargunnock and Touch Hills form an elevated backdrop, while to the west Cairnoch Hill contains more distant views.

- 7.7.7 Views in all directions are characterised to a degree by the felling cycle of the surrounding forestry, which results in a notable reduction in the naturalness and scenic quality of the surrounding landscape. There is relatively limited built development located in the surrounding landscape though, apart from some distant, scattered houses and farmsteads apparent in views to the west, and wind turbines associated with the Earlsburn North Wind Farm situated to the north on the ridgelines of Cringate Law and Hart Hill.

Sensitivity

- 7.7.8 The value of this view is high-medium. There is no formal viewpoint at this location, but the location does constitute an attraction to the area for visitors and provides panoramic views (in the absence of forestry) across the Southern Hills LLA. The views are moderately scenic, but their quality is reduced by the damage that has occurred in the process of felling parts of the surrounding forestry.
- 7.7.9 The susceptibility of visitors would be high. In forming an understanding of the castle, visitors are likely to want to experience the setting of the castle, and therefore they are susceptible to changes in the views of the surrounding landscape.
- 7.7.10 The combination of the value of the view and the susceptibility of viewers leads to an overall **high** rating of sensitivity for visitors.

Magnitude of Change

- 7.7.11 Turbines 1, 2, and 3 would be theoretically visible to the east of this viewpoint from a minimum distance of 1.2km, with landform screening visibility of Turbine 4. Landform would also screen the entire tower of Turbine 3 and some of the lower sections of the towers of Turbines 1 and 2. In reality, there would be some additional screening to larger sections of the towers of Turbines 1 and 2 and the hub and a small part of the blades of Turbine 3 from the growing conifer plantation surrounding the Proposed Development. The proposed wind turbines would be contained within approximately 34° of the available Horizontal Field of View (HFOV). Infrastructure would be screened by landform and forestry, while the permanent met mast would be apparent above the ridgeline to the south of the proposed turbines, and tall cranes would be visible during the short-term construction and decommissioning phases. The magnitude of change on this view would be **high** for the following reasons:
- The Proposed Development is situated at close range.
 - The scale of the wind turbines would appear large relative to the scale of the existing landscape elements within the view;
 - The Proposed Development would bring movement and contrasting colour and texture to the affected section of the view;
 - Given the screening to large parts of the wind turbines, visibility of only some of the moving parts may produce a complex visual image;
 - Visibility of the permanent met mast would add to this complexity while also extending the horizontal field of view affected by the Proposed Development; and



- The Proposed Development would bring wind farm development closer to the viewpoint than operational development associated with Earlsburn.

7.7.12 Factors that moderate the magnitude of change are:

- The screening of large parts of the turbines by landform and forestry reduces the overall visibility and vertical impact of the Proposed Development;
- The screening of turbine bases by landform and forestry avoids the perception of the turbines encroaching towards the viewpoint, emphasising a sense of separation;
- The presence of operational wind turbines within the wider views, which ensures that the Proposed Development would not introduce a new characteristic element;
- The limited visibility of infrastructure reduces the potential clutter associated with the Proposed Development;
- The situation of the Proposed Development in a different sector of the available panorama to the open views of Carron Valley; and
- The landscape within the wider views is characterised by change and patterns associated with deforestation, which reduces the naturalness of the landscape.

Significance of Effect

7.7.13 The effect of the Proposed Development on views experienced by visitors would be **major** and **significant**. This is due to a combination of the factors that lead to the high magnitude of change on the view and the high sensitivity of the receptor.

Cumulative Effects

7.7.14 In relation to the consented cumulative scenario, there is theoretical visibility of the consented Earlsburn Extension and Shelloch wind farms from this viewpoint. Five turbines associated with Earlsburn Extension are theoretically visible above the Hart Hill ridgeline to the north of the viewpoint situated within the context of the operational Earlsburn Wind Farm. The towers of the Earlsburn Extension turbines are screened by landform and therefore at distances of over 4.6km they would appear to possess a smaller scale to the existing wind turbines, and as a consequence would form a relatively negligible addition to the wind farm baseline. The consented Shelloch wind turbines would be situated further to the west above the ridgeline of the Fintry Hills, with a large portion of one turbine and only blades of two other turbines theoretically visible. The three visible Shelloch turbines would provide a more discernible addition to the cumulative baseline at distances of over 2.5km, extending wind turbine development further west than is currently the case. Given the modest addition of Earlsburn Extension and the visual separation between the Proposed Development and Shelloch, the cumulative interaction between the developments would be relatively limited. However, the Proposed Development and Shelloch would extend the visual arc of wind farm development in the wider view, and as a result the addition of the Proposed Development in this scenario would be amplified slightly. A **medium-low** cumulative magnitude of change is predicted in consented cumulative scenario, which would lead to a **moderate** and **significant** cumulative effect.

7.7.15 There is no theoretical visibility of application-stage cumulative wind farms in this view, and there would therefore be no change to the cumulative effects predicted in the consented cumulative scenario. A **medium-low** cumulative magnitude of



change is therefore predicted in application-stage cumulative scenario, which would lead to a **moderate** and **significant** cumulative effect.

- 7.7.16 In summary, the Proposed Development would result in **moderate** and **significant** cumulative effects in the consented and the application-stage cumulative scenarios.

Viewpoint 2: Carron Valley Reservoir Long Distance Path

Baseline

- 7.7.17 This viewpoint is located along a section of the Carron Valley Reservoir Long Distance Path, which is located approximately 2km south west of the Proposed Development. The section of the route which is located approximately 1.5km south of Todholes and 5km west of the Forestry and Land Scotland / Forestry Commission's 'Carron Valley' Car Park does not form part of the publicised Forestry and Land Scotland / Forestry Commission walking or mountain biking trail network, but it can be reached using the network of logging tracks. The location provides brief open views across the confluence of the River Carron and the Carron Valley Reservoir towards Cairnoch Hill, which are likely to be experienced by walkers or cyclists travelling over longer distances.
- 7.7.18 This viewpoint is located within the floor of Carron Valley, which is characterised by the Forested River Basin – Carron Valley LCT, and as such the area is largely contained by the surrounding hills and forestry. This enclosure is best expressed beyond the immediate flat, wetland that borders the river in views to the south, west and north, where views tend to comprise entirely of woodland and forestry, with the exception of occasional glimpses of Dungle and Campsie Muir in the background when viewing west. The view to the east across the confluence of the River Carron and the Carron Valley Reservoir towards Cairnoch Hill is framed by the surrounding woodland and forestry, and it therefore provides a natural focus from this location. The reservoir is relatively well hidden by vegetation in the foreground, while Cairnoch Hill is characterised by the evolving forestry cycle, which is apparent in the form of the various geometric forestry units and their different heights and areas of clear-fell.
- 7.7.19 There are no signs of settlement within the view, but the overall character of the landscape is heavily influenced by the commercial forestry operations in the surrounding area, and as a result while there are perceptual responses of solitude at this location, the naturalness of the landscape within the view is not of a particularly high level. It is also noteworthy that those walking or cycling to this location from the south would have also experienced glimpses of Earlsburn Wind Farm situated to the north of Cairnoch Hill, which is screened behind forestry from the viewpoint location.

Sensitivity

- 7.7.20 The value of this view is medium. There is no formal viewpoint at this location, but the landscape within the view forms part of the locally designated Southern Hills LLA. The view towards the Proposed Development is only moderately scenic though, and it is neither formally nor informally recognised at a local level.
- 7.7.21 The susceptibility of recreational walkers and cyclist would be high. Recreational walkers and cyclists are likely to visit the network of forest trails with some expectation to experience views of the locally designated landscape, although this may be slightly subdued by the enclosed nature of the trails within the commercial forestry.



- 7.7.22 The combination of the value of the view and the susceptibility of viewers leads to an overall **high-medium** rating of sensitivity for recreational walkers and cyclists.

Magnitude of Change

- 7.7.23 Part of the towers, hubs and blades of Turbines 1, 2, and 3 would be theoretically visible to the north east of this viewpoint from a minimum distance of 2.5km, with landform screening visibility of the majority of Turbine 4 apart from its blade. In reality, there would be some additional screening to the turbine towers from the growing conifer plantation surrounding the Proposed Development, which would increase over the lifetime of the project until the next felling cycle. The proposed wind turbines would be contained within approximately 32° of the available HFOV. Infrastructure, including the access tracks, crane hardstandings, and substation compound, and the borrow pit would be visible to varying degrees depending on the maturity of the forestry, and tall cranes would be visible during the short-term construction and decommissioning phases. The magnitude of change on this view would be **high** for the following reasons:
- 7.7.24 The Proposed Development is situated at relatively close range.
- The scale of the wind turbines would appear large relative to the scale of the existing landscape elements within the view;
 - The Proposed Development would bring additional movement and contrasting colour and texture to the affected section of the view;
 - The position of the Proposed Development on the containing ridgeline of Carron Valley, above the Reservoir, which forms a principal focus of views from this location;
 - The Proposed Development would bring wind farm development closer to the viewpoint than operational development associated with Earlsburn, which currently only has a modest influence upon the view; and
 - Visibility of the permanent met mast would add some additional complexity to the view.
- 7.7.25 Factors that moderate the magnitude of change are:
- The screening of parts of the turbines by landform and forestry reduces the overall visibility and vertical impact of the Proposed Development;
 - The simple, coherent design of the wind turbines with no instances of blades overlapping;
 - The screening of turbine bases by landform and forestry avoids the perception of the wind turbines encroaching towards the viewpoint, emphasising a sense of separation;
 - The presence of operational wind turbines within the wider views, which ensures that the Proposed Development would not introduce an entirely new characteristic element; and
 - The landscape within the wider views is characterised by change and patterns associated with deforestation, which reduces the naturalness of the landscape.

Significance of Effect

- 7.7.26 The effect of the Proposed Development on views experienced by recreational walkers would be **major** and **significant**. This is due to a combination of the factors



that lead to the high magnitude of change on the view and the medium- high sensitivity of the receptor.

Cumulative Effects

- 7.7.27 In relation to the consented cumulative scenario, there is theoretical visibility of the consented Earlsburn Extension wind farm from this viewpoint. Six wind turbines would be visible to the north of the Proposed Development integrated contained within the operational Earlsburn Wind Farm of the distant Hart Hill ridgeline, with three wind turbines visible to hub height and three wind turbines with visibility of blades only. All six wind turbines would be situated beyond intervening conifer forestry though and as a consequence would not be visible in reality. There would therefore be **no change** to the cumulative effects described in the baseline.
- 7.7.28 There is no theoretical visibility of application-stage cumulative wind farms in this view, and there would therefore be **no change** to the cumulative effects predicted in the consented cumulative scenario.
- 7.7.29 In summary, there would be **no change** to the cumulative effects described in the baseline in the consented and application-stage cumulative scenarios.

Viewpoint 3: Carron Valley Forestry Commission Car Park

Baseline

- 7.7.30 The viewpoint is located in between the Forestry Commission' Carron Valley Car Park that supports the Carron Valley mountain biking and walking trails and the nearby picnic area, approximately 100m to the south of the B818 road and 300m east of Carron Valley. The view is therefore representative of those experienced by visitors who are likely to be undertaking recreational walking or cycling activities, or sitting at the picnic area.
- 7.7.31 The viewpoint is located on the floor of Carron Valley, and there is therefore a degree of enclosure experienced in most directions at the viewpoint due to the presence of intermittent riparian woodland. There are however some gaps in the woodland cover where more far-reaching views towards the containing hills and the Proposed Development can be experienced, for example, there are unobstructed north-western views towards the broad ridgeline of Craigannet Hill. The view in this direction is characterised by the native broadleaf woodlands and livestock farmland that are located across this part of the valley, rather than the more populous conifer forests that are found in the wider area.
- 7.7.32 From the car park, views towards the Proposed Development are likely to be experienced in the context of some movement generated by visitors, but this activity would be less apparent from the picnic area. The view from the picnic area would be characterised by a relatively undeveloped landscape of livestock farmland, with Craigannet Farm visible on the lower slopes of Craigannet Hill and potential vehicle movement apparent on the B818 in the midground.

Sensitivity

- 7.7.33 The value of this view is high-medium. There is no formal viewpoint at this location, but it is situated at a well visited recreational location at the local level. The viewpoint and landscape within the view form part of the locally designated Southern Hills LLA.
- 7.7.34 The susceptibility of visitors using the picnic area would be high, while the susceptibility of visitors located in the car park is likely to be lower. Visitors to the trails would visit the picnic area with some expectation to experience views of the



locally designated landscape, and they would experience the views over a relatively long duration. The susceptibility of those in the car park is likely to be lower due to the transient nature of how they would experience the views with the visitors either in the process of arriving or leaving the location.

- 7.7.35 The combination of the value of the view and the susceptibility of viewers leads to an overall **high** rating of sensitivity for visitors.

Magnitude of Change

- 7.7.36 Turbines 2, 3 and 4 would be theoretically visible to the north-west of this viewpoint from a minimum distance of 2.1km, with landform screening visibility of Turbine 1. Landform would also screen the towers and hubs of Turbines 2 and 4, and the majority of the tower of Turbine 3. In reality, there would be some additional screening to the tower and hub of Turbine 3 from some intervening trees. The proposed wind turbines would be contained within approximately 8° of the available HFOV. Infrastructure would be screened by landform and forestry, although tall cranes would be visible during the short-term construction and decommissioning phases. The magnitude of change on this view would be **low** for the following reasons:

- The Proposed Development is situated at relatively close range;
- The Proposed Development would bring movement and contrasting colour and texture to the affected section of the view, specifically when seasonal foliage screens visibility of the operational Craigengelt Wind Farm;
- Given the screening to large parts of the wind turbines, visibility of only some of the moving parts may produce a complex visual image;
- The degree of contrast between the wind turbines and the smaller scale traditional farmland in the view; and
- The view would be experienced by static viewers using the picnic facilities.

- 7.7.37 Factors that moderate the magnitude of change are:

- The screening of large parts of the turbines by landform reduces the overall visibility and vertical impact of the Proposed Development;
- The Proposed Development would affect a limited proportion (around 8°HFOV) of the view that is available from this viewpoint;
- The turbines are clearly situated beyond the immediate farmland landscape, with the separation emphasised by the absence of visible turbine towers; and
- The absence of visibility of infrastructure reduces the potential clutter associated with the Proposed Development.

Significance of Effect

- 7.7.38 The effect of the Proposed Development on recreational walkers would be **moderate-minor** and **not significant**. This is due to a combination of the factors that lead to the low magnitude of change on the view and the high sensitivity of the receptor.

Cumulative Effects

- 7.7.39 There is no theoretical visibility of consented cumulative wind farms in this view, and there would therefore be **no change** to the cumulative effects predicted in the baseline.



- 7.7.40 In relation to the application-stage cumulative scenario, there is some limited visibility of four turbine blades associated with the Drummarnock Wind Farm application to the north of the viewpoint. The wind turbine blades would be visible above the slopes of Craigannet Hill at distances of over 3.3km in the context of the nearby Craigengelt Wind Farm. In reality, visibility of the proposed Drummarnock Wind Farm wind turbines would be interrupted or entirely screened by intervening woodland that surrounds the picnic area. There would therefore be only limited potential for a cumulative interaction between the Proposed development and the Drummarnock Wind Farm application. As a result, a **negligible** cumulative magnitude of change to the view is predicted to arise in this scenario, which would lead to a **minor** and **not significant** cumulative effect.
- 7.7.41 In summary, there would be **no change** to the cumulative effects described in the baseline in the consented cumulative scenario, and a **minor** and **not significant** cumulative effect would arise in the application-stage cumulative scenario.

Viewpoint 4: Carron Valley Reservoir Shore Trail

Baseline

- 7.7.42 This viewpoint is located at the end of the sign-posted Loch Shore Trail, which is situated approximately 1.7km south west of the Carron Valley Forestry Commission car park and 2km south of the Proposed Development. The viewpoint, which provides panoramic views encompassing the whole length of the reservoir, is primarily visited by recreational walkers and potentially also some naturalists.
- 7.7.43 The outlook from the viewpoint is heavily influenced by its position on a small peninsula, which increases the influence of the surrounding waters such that the loch's full scale can be appreciated. From the viewpoint, the Carron Valley Reservoir therefore provides a focus in views to the north, east and west, while forestry appears to recede up the gentle slopes to the south of the viewpoint. The reservoir's immediate surroundings comprise individual and clusters of scattered broadleaf trees and woodland though, which provide the shoreline with a more natural character. Beyond the reservoir, the enclosing hills typically form smooth, often forested ridgelines, with the summit of Meikle Bin notably more defined.
- 7.7.44 There are very limited signs of development within the view, with the exception of the short row of pale houses associated with the settlement of Carron Valley, but the overall character of the landscape is heavily influenced by the commercial forestry operations in the surrounding area, due to the different growth cycles. Occasional vehicle movement may also be apparent on the B818 on the northern shoreline of the reservoir.

Sensitivity

- 7.7.45 The value of this view is high-medium. There is no formal viewpoint at this location, but the landscape within the scenic view forms part of the locally designated Southern Hills LLA. The viewpoint is also located on a locally recognised walk where seating is provided to allow visitors to appreciate the view.
- 7.7.46 The susceptibility of recreational walkers and cyclist would be high. Recreational walkers and cyclists on the shoreline are likely to have an expectation that they would experience views of the locally designated landscape.
- 7.7.47 The combination of the value of the view and the susceptibility of viewers leads to an overall **high** rating of sensitivity for recreational walkers and cyclists.



Magnitude of Change

- 7.7.48 Part of the towers, hubs and blades of Turbines 2, 3 and 4 would be theoretically visible to the north west of this viewpoint from a minimum distance of 2.1km, with landform screening visibility of the majority of Turbine 1 apart from its blade. In reality, there would be some additional screening to the turbine towers from the growing conifer plantation surrounding the Proposed Development, which would increase over the lifetime of the project until the next felling cycle. The proposed wind turbines would be contained within approximately 28° of the available HFOV. Infrastructure, including the access tracks, crane hardstandings, and substation compound, and the borrow pit would be visible to varying degrees depending on the maturity of the forestry, and tall cranes would be visible during the short-term construction and decommissioning phases. The magnitude of change on this view would be **high** for the following reasons:
- 7.7.49 The Proposed Development is situated at relatively close range.
- The scale of the wind turbines would appear large relative to the scale of the existing landscape elements within the view;
 - The Proposed Development would bring additional movement and contrasting colour and texture to the affected section of the view;
 - The position of the Proposed Development on the containing ridgeline of Carron Valley, above the Reservoir, which forms a principal focus of views from this location;
 - The Proposed Development would bring wind farm development closer to the viewpoint than operational development associated with Craigengelt, which currently only has a negligible influence upon the view; and
 - Visibility of the upper sections of the permanent anemometer mast would add some additional complexity to the view.
- 7.7.50 Factors that moderate the magnitude of change are:
- The screening of parts of the wind turbines by landform and forestry reduces the overall visibility and vertical impact of the Proposed Development;
 - The simple, coherent design of the wind turbines with no instances of blades overlapping;
 - The screening of turbine bases by landform and forestry avoids the perception of the turbines encroaching towards the viewpoint, emphasising a sense of separation; and
 - The landscape within the wider views is characterised by change and patterns associated with deforestation, which reduces the naturalness of the landscape.

Significance of Effect

- 7.7.51 The effect of the Proposed Development on views experienced by recreational walkers would be **major** and **significant**. This is due to a combination of the factors that lead to the high magnitude of change on the view and the medium-high sensitivity of the receptor.

Cumulative Effects

- 7.7.52 In relation to the consented cumulative scenario, there is theoretical visibility of the consented Shelloch Wind Farm from this viewpoint. Five wind turbines would be theoretically visible to the north of the viewpoint, with a large portion of one of the



wind turbine tower's theoretically visible, and either none or only a small amount of the towers of the other four wind turbines theoretically visible. The Shelloch wind turbines would appear evenly spaced, situated above the ridgeline of the Fintry Hills at distances of over 6km. The Proposed Development would be situated closer at distances of over 2.1km from the viewpoint, and as a result would provide the prevailing cumulative influence from this location. The Proposed Development would therefore increase the horizontal extent of the view that contains wind farm development, albeit maintaining a similar design composition to Shelloch with wind turbines evenly spaced along the ridgeline of Cairnoch Hill. As a result, a **medium** cumulative magnitude of change to the view is predicted to arise in this scenario, which would lead to a **major-moderate** and **significant** cumulative effect.

- 7.7.53 There is no theoretical visibility of application-stage cumulative wind farms in this view, and there would therefore be no change to the cumulative effects predicted in the consented cumulative scenario. As a consequence, **major-moderate** and **significant** cumulative effects are still predicted to arise.
- 7.7.54 In summary, there would be a **major-moderate** and **significant** cumulative effect predicted in the consented and application-stage cumulative scenarios.

Viewpoint 5: Minor road, near Easter Cringate Cottage

Baseline

- 7.7.55 The viewpoint is located on the minor road that connects the northern edge of the Carron Valley Reservoir to Stirling via Earl's Hill. The view is representative of the views experienced by road-users on this minor road and the small number of residents in the farmsteads along the road. The viewpoint is located 2.5km from the closest proposed wind turbine and the view is orientated south west towards the Proposed Development.
- 7.7.56 This viewpoint is located in an area characterised by the Lowland Hills – Fintry, Gargunnock and Touch Hills LCT, which possesses a relatively simple and open landscape, which contrasts with the nearby Forested River Basin to the south of the viewpoint. Views from this location are relatively contained by the surrounding landforms that comprise of a number of hills of similar elevations, with only glimpses of more far reaching views available in between the various hill summits. Given the consistency of the smooth landforms, the changes in landcover are particularly noticeable, with the forested Cairnoch Hill providing a notably more modified and rigid landscape feature.
- 7.7.57 There is some scattered development across the broad panorama, including the solitary cottage at Easter Cringate, the Earlsburn and Craigengelt Wind Farms and Craigannet wind turbines that extend across the views to the south-east and west, and the telegraph poles that follow a similar route to the road down the hill slopes.

Sensitivity

- 7.7.58 The value of this view is high-medium. There is no formal viewpoint at this location, although it does offer some amenity to the nearby dwelling at Easter Cringate Cottage, and the landscape within the view forms part of the Southern Hills LLA and Kilsyth Hills SLA. The view of the surrounding moorland and forestry is moderately scenic and as such the overall value is high-medium.
- 7.7.59 The susceptibility of road-users and residents to the Proposed Development would be high-medium and high respectively. Although this road is not a tourist route, some road users who are visitors are likely to have an expectation that they would experience views of the locally designated landscape when travelling, albeit these



may be fleeting at times, and they would therefore have a high-medium susceptibility. Residents would be able to appreciate these views for longer periods from the curtilage of the nearby property, and as such their susceptibility is higher.

- 7.7.60 The combination of the value of the view and the susceptibility of viewers leads to an overall **high-medium to high** rating of sensitivity for road users and residents respectively.

Magnitude of Change

- 7.7.61 All four of the wind turbines would be theoretically visible to the south west of this viewpoint from a minimum distance of 2.3km, with all hubs and blades theoretically visible, but landform would screen some of the lower sections of the towers of T1 and T4. In reality, there would be some additional screening to lower sections of each of the towers from the growing conifer plantation surrounding the Proposed Development, which would increase over the lifetime of the project until the next felling cycle. The proposed wind turbines would be contained within approximately 40° of the available HFOV. Infrastructure would generally be screened by landform and forestry, although tall cranes would be visible during the short-term construction and decommissioning phases. The magnitude of change on this view would be **high** for the following reasons:

- The Proposed Development is situated at close range within an open part of the view;
- The Proposed Development would occupy a broad sector of the view due to the alignment of the wind turbines;
- The Proposed Development would be situated in between the operational Craigengelt, Craigannet, and Earlsburn Wind Farms, such that wind turbines would characterise an increased proportion of the available view;
- The Proposed Development would form a coherent linear arrangement of wind turbines upon Cairnoch Hill, in contrast to the more irregular arrangement of turbines associated with Craigengelt Wind Farm;
- The larger scale of the proposed turbines would contrast slightly with the nearby smaller Craigannet turbine;
- Visibility of the upper sections of the permanent anemometer mast would add some additional complexity to the view; and
- The possible further visual complexity associated with visibility of some of the various elements of wind farm infrastructure after forestry felling cycles.

- 7.7.62 Factors that moderate the magnitude of change are:

- The screening of lower sections of the turbine towers by landform and forestry reduces the overall visibility and vertical impact of the Proposed Development;
- The screening of turbine bases by landform and forestry avoids the perception of the turbines encroaching towards the viewpoint, giving a sense of separation;
- The presence of operational wind turbines within the wider views, which ensures that the Proposed Development would not introduce a new characteristic element;
- The simple, coherent design of the wind turbines with consistent spacing; and
- The limited visibility of infrastructure reduces the potential clutter associated with the Proposed Development.



Significance of Effect

- 7.7.63 The effect of the Proposed Development on road users and residents would be **major** and **significant**. This is due to a combination of the factors that lead to the high magnitude of change on the view and the high-medium to high sensitivity of the viewpoint.

Cumulative Effects

- 7.7.64 There is no theoretical visibility of consented cumulative wind farms in this view, and there would therefore be **no change** to the cumulative effects predicted in the baseline.
- 7.7.65 In relation to the application-stage cumulative scenario, there is visibility of four wind turbines associated with the Drummarnock Wind Farm application to the east of the viewpoint. The wind turbines would be visible at distances of over 1km with two wind turbines visible to hub and blade tip height with varying portions of their towers theoretically visible, and only the blades of the other two wind turbines theoretically visible. The Drummarnock wind turbines would appear as an extension to the nearby Craigengelt Wind Farm, which is situated slightly closer on the ridgeline of the hills to the south-east of the viewpoint. The presence of other operational wind farm development, such as Earlsburn and Craigannet further intensify the influence of wind farm development upon views. The Proposed Development would be situated to the south west of this viewpoint and would further increase the horizontal extent of the view that is affected by wind farm development. As a consequence, the Proposed Development would affect a sector of the view that currently provides some separation between existing wind farm development, and this increases the cumulative magnitude of the change. As a result, a **high-medium** cumulative magnitude of change to the view is predicted to arise in this scenario, which would lead to a **major** and **significant** cumulative effect.
- 7.7.66 In summary, there would be **no change** to the cumulative effects described in the baseline in the consented cumulative scenario, and a **major** and **significant** cumulative effect would arise in the application-stage cumulative scenario.

Viewpoint 6: Tomtain

Baseline

- 7.7.67 This viewpoint is located on the summit of Tomtain, which is the highest location in the Kilsyth Hills. The summit of Tomtain (453m AOD) can be accessed by recreational walkers from the viewpoint car park on the Tak Ma Doon Road, which is situated approximately 1.3km to the east of the viewpoint. For the most part, the relatively short walking route follows the edge of the commercial forestry plantation to the north of Tomtain, and as a result views to the north towards the Proposed Development are generally limited to the summit area, where there is only a scattering of conifer trees. The location of the trig point at the summit provides excellent opportunities for views of the settled lowlands to the south, but views to the north are slightly screened by landform, and as such the viewpoint has been located slightly to the north of the trig point.
- 7.7.68 The viewpoint is located within an area that is characterised by the Rugged Moorland Hills LCT. There are panoramic views in all directions from the summit of the hill, encompassing the settled lowlands of the Kelvin Valley and Greater Glasgow beyond to the south and south-west, the Slamannan plateau to the south-east, the Firth of Forth and its surrounding carselands to the east, the Denny Hills and Ochil Hills beyond to the north-east, Carron Valley and the Touch Hills to the



north, the Carron Valley Reservoir, the Fintry Hills and Ben Lomond beyond to the north west, and the Kilsyth and Campsie Fells to the west.

- 7.7.69 The viewpoint is located on the threshold of a large cluster of hill ranges that extends further to the north, and as a result, the more settled and less undulating landform of the landscape in views to the south contrasts with the more natural, elevated landscape to the north. The landscapes to the south contains some of the most densely settled parts of Scotland, including the city of Glasgow, whereas the landscape to the north contains the Kilsyth, Campsie, Denny, Gargunnock, and Fintry hill ranges. These hill ranges are relatively undeveloped, but there is evidence of human influences as a result of commercial forestry plantations and wind farm development. The operational Craigengelt, Earlsburn, and Earlsburn North Wind Farms are notable influences within 10-11km of the Tomtain summit.

Sensitivity

- 7.7.70 The value of this view is high-medium. There is no formal viewpoint at this location, and while the car park is located at a formal viewpoint, the Proposed Development is not visible from this location. The landscape within the view forms part of the locally designated Kilsyth Hills SLA, Campsie Fells LLA, Denny Hills LLA and Southern Hills LLA, and this increases its value. The viewpoint is also located on a locally recognised walk.
- 7.7.71 The susceptibility of recreational walkers would be high. Recreational walkers are likely to visit the hill summit with some expectation to experience panoramic views of the locally designated landscapes, and the contrasting characteristics of the landscapes to the north and the south is likely to form part of this experience.
- 7.7.72 The combination of the value of the view and the susceptibility of viewers leads to an overall **high** rating of sensitivity for recreational walkers.

Magnitude of Change

- 7.7.73 All four of the wind turbines would be theoretically visible to the north west of this viewpoint from a minimum distance of 4.2km, with all hubs and blade tips theoretically visible, but landform would screen varying proportions of the towers of Turbines 1 and 2. The majority of Turbine 1's tower would be screened by landform, while around half of Turbine's 2 would be screened. The turbines therefore appear to recede over Cairnoch Hill the greater the distance from the viewpoint. In reality, there would be some additional screening to each of the turbines from the growing conifer plantation surrounding the Proposed Development, which would increase over the lifetime of the project until the next felling cycle. The proposed wind turbines would be contained within approximately 11° of the available HFOV. Infrastructure, including the access tracks, crane hardstandings, and substation compound, and the borrow pit would be visible to varying degrees depending on the maturity of the forestry, and tall cranes would be visible during the short-term construction and decommissioning phases. The magnitude of change on this view would be **medium** for the following reasons:
- The Proposed Development is situated at a medium range;
 - The scale of the wind turbines would appear slightly large relative to the scale of the existing landscape elements within the view;
 - The position of the Proposed Development close to the edge of Carron Valley, which forms a relatively scenic sector of the view, backed by the peaks of the Loch Lomond and The Trossachs National Park;



- The Proposed Development would bring wind farm development closer to the viewpoint than operational development associated with Earlsburn, Earlsburn North and Craigengelt, increasing the influence of wind farm development upon this sector of the view;
- The proposed wind turbines would contrast with the smaller scale of the nearby Craigannet turbine; and
- Visibility of the permanent anemometer mast, sections of the access tracks, the substation compound, and the temporary construction compound would add some additional complexity to the view.

7.7.74 Factors that moderate the magnitude of change are:

- The screening of some of the sections of the turbine towers by landform and forestry reduces the overall visibility and vertical impact of part of the Proposed Development;
- The relatively simple, coherent design of the wind farm (albeit the lower elevation of T1 adds a degree of complexity);
- The presence of operational wind turbines within the wider views, which ensures that the Proposed Development would not introduce a new characteristic element;
- The Proposed Development would be situated within the same sector of the view as these operational wind farms; and
- The landscape within the wider views is characterised by change and patterns associated with deforestation, which reduces the naturalness of the landscape.

Significance of Effect

7.7.75 The effect of the Proposed Development on views experienced by recreational walkers would be **major-moderate** and **significant**. This is due to a combination of the factors that lead to the medium magnitude of change on the view and the high sensitivity of the receptor.

Cumulative Effects

7.7.76 In relation to the consented cumulative scenario, there is theoretical visibility of the consented Shelloch and Earlsburn Extension wind farms situated within the hills to the north west and north of Carron Valley. The introduction of these consented developments would intensify the characteristic influence of wind farms within these hills in part by reducing the visual separation between Earlsburn and Craigengelt Wind Farms and also be increasing the arc of the view to the west that is affected by wind farm development. The Proposed Development would be situated within a similar sector of the view to these wind farms, and closer, and as a consequence it would further intensify this characteristic of the view. The Proposed Development would be located at a similar distance from the viewpoint as the operational Craigannet and Craigengelt Wind Farms, but its greater vertical scale and the elevation of the Site would increase its prominence relative to these other developments. These factors would increase the cumulative magnitude of change to a **high-medium** level in the consented cumulative scenario, which would result in a **major** and **significant** cumulative effect.

7.7.77 In relation to the application-stage cumulative scenario, the Drummarnock application would be apparent close to the operational Craigengelt Wind Farm, extending the arc of wind farms further to the north-east of Carron Valley. The Drummarnock application would therefore further intensify the influence of wind



farms within the view. The cumulative effects of the Proposed Development in this scenario would be relatively similar to those predicted in the consented cumulative scenario due to the relatively similar pattern of development within the view. The cumulative magnitude of change would therefore remain at a **high-medium** level in the consented cumulative scenario, which would result in a **major** and **significant** cumulative effect.

- 7.7.78 In summary, the Proposed Development would result in **major** and **significant** cumulative effects in the consented and application-stage cumulative scenarios.

Viewpoint 7: Meikle Bin

Baseline

- 7.7.79 This viewpoint is located on the summit of Meikle Bin, which is the second highest hill in the Campsie Fells. The summit of Meikle Bin (570m AOD) can be accessed by recreational walkers from the small parking area on the B818, opposite the entrance to Todholes Farm, which is situated approximately 3.7km to the north of the viewpoint. The walking route primarily follows forestry tracks, and as a result views are often contained by the conifer forestry. However, views are panoramic from the summit area where there is no enclosure from forestry, extending beyond the immediate landscape in all directions.
- 7.7.80 The viewpoint is located on the edge of an area that is characterised by the Forested River Basin – Carron Valley LCT, but it is also close to nearby areas that are characterised by the Rugged Moorland Hills LCT. Both of these LCTs are therefore illustrated in the panoramic views that are available from Meikle Bin. The views from the summit of the hill encompass the Carron Valley Reservoir in the midground to the north and north east, with the Gargunnock, Touch and Fintry hills rising beyond, and the Ochil Hills discernible at even greater distance. To the north west, the distant hills of the LLTNP are visible beyond the Endrick Water valley, while to the west and south-west the ridges of the Campsie Fells extend to the summit of Earl's Seat in the distance. To the south and south-east, the Campsie Fells and Kilsyth Hills form the foreground and midground of the view, with the settled lowlands of the Kelvin Valley and the carselands around the Firth of Forth apparent beyond these hills.
- 7.7.81 The viewpoint is located on the northern edge of the Kilsyth Hills and as a result, it is surrounded by moorland hills and forestry, with distinct separation from the more settled lowland landscapes to the south. The perceived naturalness of the surrounding landscape is however reduced by the large levels of commercial conifer forestry, which are emphasised by some distinct areas of clear fell, and the operational Craigengelt, Earlsburn, and Earlsburn North Wind Farms, situated to the north and north east of the Carron Valley Reservoir.

Sensitivity

- 7.7.82 The value of this view is high-medium. There is no formal viewpoint at this location, but the majority of the landscape within the view forms part of the locally designated Southern Hills LLA, Kilsyth Hills SLA, Campsie Fells LLA, and Denny Hills LLA, and this increases its value. The viewpoint is also located on a locally recognised walk.
- 7.7.83 The susceptibility of recreational hill walkers would be high. Recreational walkers are likely to visit the hill summit and the footpaths in Carron Valley with some expectation to experience views of the locally designated landscapes.
- 7.7.84 The combination of the value of the view and the susceptibility of viewers leads to an overall **high** rating of sensitivity for recreational hill walkers.



Magnitude of Change

- 7.7.85 All four of the wind turbines would be theoretically visible to the north east of this viewpoint from a minimum distance of 4.7km, with all of the towers, hubs and blades theoretically visible. In reality, there would be some additional screening to each of the wind turbines from the growing conifer plantation surrounding the Proposed Development, which would increase over the lifetime of the project until the next felling cycle. The proposed wind turbines would be contained within approximately 21° of the available HFOV. Infrastructure, including the permanent met mast, access tracks, crane hardstandings, and substation compound, and the borrow pit would be visible to varying degrees depending on the maturity of the forestry, and tall cranes would be visible during the short-term construction and decommissioning phases. The magnitude of change on this view would be **medium** for the following reasons:
- 7.7.86 The Proposed Development is situated at a medium range.
- The scale of the wind turbines would appear slightly large relative to the scale of the existing landscape elements within the view;
 - The position of the Proposed Development close to the edge of Carron Valley, which forms a relatively scenic sector of the view;
 - The Proposed Development would bring wind farm development closer to the viewpoint than operational development associated with Earlsburn, Earlsburn North and Craigengelt;
 - The Proposed Development would infill the gap between the operational Earlsburn and Craigengelt Wind Farms, increasing the influence of wind farm development upon this sector of the view;
 - The proposed wind turbines would contrast with the smaller scale of the nearby Craiganet turbine; and
 - Visibility of the permanent anemometer mast, sections of the access tracks, the substation compound, and the temporary construction compound would add some additional complexity to the view.
- 7.7.87 Factors that moderate the magnitude of change are:
- The relatively simple, coherent design of the wind farm;
 - The presence of operational wind turbines within the wider views, which ensures that the Proposed Development would not introduce a new characteristic element;
 - The Proposed Development would be situated within a similar sector of the view as these operational wind farms; and
 - The landscape within the wider views is characterised by change and patterns associated with deforestation, which reduces the naturalness of the landscape.

Significance of Effect

- 7.7.88 The effect of the Proposed Development on views experienced by recreational hill walkers would be **major-moderate** and **significant**. This is due to a combination of the factors that lead to the medium magnitude of change on the view and the high sensitivity of the receptor.



Cumulative Effects

- 7.7.89 In relation to the consented cumulative scenario, there is theoretical visibility of the consented Shelloch and Earlsburn Extension wind farms situated within the hills to the north-west and north of Carron Valley. The introduction of these consented developments would intensify the characteristic influence of wind farms within these hills, and Shelloch would also increase the arc of the view to the west that is affected by wind farm development. The Proposed Development would be situated within a similar sector of the view to these wind farms, albeit closer, and situated within a gap between the Earlsburn and Earlsburn Extension wind farm cluster and the Craigengelt and Craigannet cluster. The closer location of the Proposed Development and its situation within these two wind farm clusters would increase the cumulative magnitude of change by bringing wind farm development closer to the view and also reducing the spacing between existing wind farm clusters. A **high** cumulative magnitude of change would therefore arise in the consented cumulative scenario, which would result in a **major** and **significant** cumulative effect.
- 7.7.90 In relation to the application-stage cumulative scenario, the Drummarnock Wind Farm application would be apparent situated within the context of the operational Craigengelt Wind Farm. The Drummarnock Wind Farm application would therefore slightly intensify the influence of wind farms within the view, without increasing the arc of the view that is affected by wind farms. The cumulative effects of the Proposed Development in this scenario would therefore be relatively similar to those predicted in the consented cumulative scenario due to the relatively similar pattern of wind farm development in the view. The cumulative magnitude of change would therefore remain at a **high** level, which would result in a **major** and **significant** cumulative effect.
- 7.7.91 In summary, the Proposed Development would result in **major** and **significant** cumulative effects in the consented and application-stage cumulative scenarios.

Viewpoint 8: Tak Ma Doon Road

Baseline

- 7.7.92 This viewpoint is located on Tak Ma Doon Road, approximately 350m to the north of Tak Ma Doon Road Viewpoint and 2km to the south of Carron Bridge. The road runs adjacent to a conifer plantation and therefore in reality the majority of views to the west and north-west are screened to a degree. The viewpoint therefore represents a worst-case view from an elevated roadside verge that that could be experienced by road users. This particular section of the road is situated further north than the section of the road that forms part of the walking route from the viewpoint car park to the summit of Tomtain, and it is therefore not representative of views experienced by recreational walkers following this route.
- 7.7.93 The viewpoint is located within an area that is located on the transition between the Rugged Moorland Hills and Lowland Hills – Central LCTs. Views to the south are generally contained by the rising landform, while views to the west and north west are partially screened by the nearby conifer forestry. There are some interrupted views towards the distant Gargunnock Hills to the north west though and more open views to the north and north east towards the Touch and Denny Hills. The distant Ochil Hills can also be viewed beyond the Kilsyth Hills to the east. Overall, the landscape is characterised by a tapestry of open moorland and conifer forestry with some distant farmland visible to the west.
- 7.7.94 The landscape has few signs of settlement, but it is heavily modified by the commercial forestry plantations, and there is also evidence of operational wind farms beyond Carron Valley. In particular, the Craigengelt, Earlsburn, and Earlsburn



North Wind Farms are notable influences at distances of over 4km from the viewpoint.

Sensitivity

- 7.7.95 The value of this view is high-medium. There is no formal viewpoint at this location, although the landscape within the view forms part of the Kilsyth Hills SLA, Denny Hills LLA and Southern Hills LLA. The view of the surrounding moorland and commercial conifer forestry is moderately scenic and as such the overall value is high-medium.
- 7.7.96 The susceptibility of road-users to the Proposed Development would be high-medium. Although this road is not a tourist route, some road users who are visiting are likely to have an expectation that they would experience views of the locally designated when travelling, albeit these may be fleeting at times, and they would therefore have a high-medium susceptibility.
- 7.7.97 The combination of the value of the view and the susceptibility of viewers leads to an overall **high-medium** rating of sensitivity for road users.

Magnitude of Change

- 7.7.98 All four of the wind turbines would be theoretically visible to the north west of this viewpoint from a minimum distance of 4.8km, with the hubs and blade tips of Turbines 2, 3, and 4 theoretically visible, but landform would screen a larger proportion of Turbine 1 such that only a single blade tip is theoretically visible. There would also be a degree of screening from landform to approximately half of the towers of Turbines 2 and 4. In reality, there would be some additional screening to each of the wind turbines from the growing conifer plantation surrounding the Proposed Development, which would increase over the lifetime of the project until the next felling cycle, and also from other forestry situated between the viewpoint and the Proposed Development. The proposed wind turbines would be contained within approximately 5° of the available HFOV. Infrastructure and the borrow pit would generally be screened by landform and forestry, although tall cranes would be visible during the short-term construction and decommissioning phases. The magnitude of change on this view would be **low** for the following reasons:
- The Proposed Development is situated at a moderate distance from the viewpoint;
 - The proposed wind turbines would be visible above the skyline; and
 - The Proposed Development would extend the arc of visible wind farm development in the view, which also contains Craigengelt Wind Farm.
- 7.7.99 Factors that moderate the magnitude of change are:
- The screening of the parts of the turbines by landform and forestry reduces the overall visibility and vertical impact of the wind turbines;
 - The compact design of the Proposed Development would affect a limited proportion (around 5° HFOV) of the view that is available from this viewpoint;
 - The Proposed Development would be visible in oblique views relative to the direction of the road;
 - Views of the Proposed Development would be glimpsed due to the speed of travellers on the road;



- The presence of operational wind turbines within the same sector of the view, which ensures that the Proposed Development would not introduce a new characteristic element; and
- The absence of visibility of infrastructure reduces the potential clutter associated with the Proposed Development.

Significance of Effect

- 7.7.100 The effect of the Proposed Development on road users would be **moderate-minor** and **not significant**. This is due to a combination of the factors that lead to the low magnitude of change on the view and the medium-high sensitivity of the receptor.

Cumulative Effects

- 7.7.101 In relation to the consented cumulative scenario, there is theoretical visibility of the consented Shelloch and Earlsburn Extension wind farms situated within the hills to the north west and north of Carron Valley. Theoretical visibility of Shelloch is limited to the blades of five turbines at distances of over 9.3km, which in reality would be screened by conifer forestry. The seven Earlsburn Extension wind turbines that are theoretically visible would be apparent within gaps in the surrounding forestry occupying the space between the Earlsburn and Craigengelt wind farm clusters at distances of over 8.7km. Consequently, while the introduction of the Shelloch wind turbines would have no material effect upon the view, the Earlsburn Extension wind turbines would reduce the spacing between operational wind farms and in the process intensify the influence of wind turbines upon the distant hills. The introduction of the Proposed Development would be partially screened by conifer forestry, and this would weaken the cumulative interaction between it and other wind farms. Nevertheless, it is situated within the same sector of the view as Earlsburn North, and as such it would intensify the presence of wind farms within due to its closer location and larger perceived scale. A **low** cumulative magnitude of change would therefore arise in the consented cumulative scenario, which would result in **moderate-minor** and **not significant** cumulative effects.
- 7.7.102 In relation to the application-stage cumulative scenario, four of the Drummarnock wind turbines would be theoretically visible to varying degrees situated to the north and east of the operational Craigengelt Wind Farm at distances of over 5.5km. The Drummarnock Wind Farm application would therefore very slightly increase the arc of the view affected by wind farm development. Given the relatively weak influence of the Proposed Development from this location, the cumulative effects of the Proposed Development in this scenario would be relatively similar to those predicted in the consented cumulative scenario due to the broadly similar pattern of development within the view. The cumulative magnitude of change would therefore remain at a **low** level, which would result in **moderate-minor** and **not significant** cumulative effects.
- 7.7.103 In summary, the Proposed Development would result in **moderate-minor** and **not significant** cumulative effects in the consented and application-stage cumulative scenarios.

Viewpoint 9: Minor Road, near Easter Buckieburn

Baseline

- 7.7.104 This viewpoint is located on the minor road between Carron Bridge and Stirling, close to the Easter Buckieburn residential property, and approximately 2.3km north east of Carron Bridge. The view is representative of the views experienced by road-users on this minor road and the small number of residents in the occasional



farmsteads along the road. The viewpoint is located 4.7km from the closest proposed turbine and the view is orientated west towards the Proposed Development.

- 7.7.105 This viewpoint is located on the threshold of the Carron Valley in an area that is characterised by the Lowland Hills – Fintry, Gargunnock and Touch Hills LCT. The viewpoint's location close to the edge of this LCT is illustrated by the area's more varied landcover and the slight increase in the enclosure of the surrounding landforms, which reduces both the simplicity and scale of the landscape. Views to the south, east and north are generally screened by landform and shelterbelts of trees in the foreground and midground, while more open views towards the Proposed Development (and the interior of the LCT unit) are characterised by a mixture of livestock farmland, commercial conifer forestry, some scattered settlement, Craigengelt Wind Farm, and some more open hills in the distance.
- 7.7.106 The relatively high proportion of the surrounding landscape that is influenced by commercial forestry, wind farm development, and scattered farmsteads reduces the areas naturalness, which tends to reduce its scenic quality. The landscape within the views is therefore relatively varied, and it doesn't necessarily exhibit the same strength of character when compared to areas to the north-west of the LCT.

Sensitivity

- 7.7.107 The value of this view is high-medium. There is no formal viewpoint at this location, although it does offer some amenity to the nearby dwelling at Easter Buckieburn, and the landscape within the view forms part of the Southern Hills LLA. The view of the surrounding livestock farmland and forestry is only moderately scenic and as such the overall value is high-medium.
- 7.7.108 The susceptibility of road-users and residents to the Proposed Development would be high-medium and high respectively. Although this road is not a tourist route, some road users who are visitors are likely to have an expectation that they would experience views of the locally designated landscape when travelling, albeit these may be fleeting at times, and they would therefore have a high-medium susceptibility. Residents would be able to appreciate these views for longer periods from the curtilage of the nearby property, and as such their susceptibility is higher.
- 7.7.109 The combination of the value of the view and the susceptibility of viewers leads to an overall **high-medium to high** rating of sensitivity for road users and residents respectively.

Magnitude of Change

- 7.7.110 All four of the wind turbines would be theoretically visible to the west of this viewpoint from a minimum distance of 4.7km, with the hubs and blade tips of Turbines 2, 3, and 4 theoretically visible, but landform would screen a larger proportion of Turbine 1 such that only a single blade tip is theoretically visible. There would also be a degree of screening from landform to over half of the towers of Turbines 2 and 4 and a small section of the tower of Turbine 3. The proposed wind turbines would be contained within approximately 10° of the available HFOV. With the exception of the permanent anemometer mast, infrastructure and the borrow pit would be screened by landform, although tall cranes would be visible during the short-term construction and decommissioning phases. The magnitude of change on this view would be **low** for the following reasons:
- The Proposed Development is situated at a moderate distance from the viewpoint;
 - The proposed wind turbines would be visible above the skyline;



- The Proposed Development would extend the arc of visible wind farm development in the view, which also contains Craigengelt, Earlsburn and Craigannet Wind Farms; and
- Visibility of the upper sections of the permanent met mast would add some additional complexity to the view.

7.7.111 Factors that moderate the magnitude of change are:

- The screening of the parts of the turbines by landform reduces the overall visibility and vertical impact of the wind turbines;
- The compact design of the Proposed Development would affect a limited proportion (around 10°HFOV) of the view that is available from this viewpoint;
- The Proposed Development would be visible in oblique views relative to the direction of the road;
- The presence of operational wind turbines within the same sector of the view, which ensures that the Proposed Development would not introduce a new characteristic element;
- The similar perceived scale of the proposed turbine relative to those associated with Craigengelt Wind Farm; and
- The absence of visibility of infrastructure reduces the potential clutter associated with the Proposed Development.

Significance of Effect

7.7.112 The effect of the Proposed Development on road users would be **moderate-minor** and **not significant**. This is due to a combination of the factors that lead to the low magnitude of change on the view and the medium-high sensitivity of the receptor.

Cumulative Effects

7.7.113 There is no theoretical visibility of consented cumulative wind farms in this view, and there would therefore be **no change** to the cumulative effects predicted in the baseline.

7.7.114 In relation to the application-stage cumulative scenario, the four Drummarnock wind turbines would be theoretically visible to varying degrees to the east of the operational Craigengelt and Earlsburn Wind Farms at distances of over 2.2km. The Drummarnock Wind Farm application would slightly increase the arc of the view affected by wind farm development, while also bringing larger scale wind turbines slightly closer to the viewpoint. The Proposed Development would be located to the west of the Craigengelt Wind Farm and would therefore also increase the arc of view affected by wind farm development but situated at greater distances than the Drummarnock wind turbines from the viewpoint. The proposed wind turbines would appear to form a coherent extension to the Craigengelt Wind Farm, maintaining a similar scale and spacing, which would help to moderate the magnitude of cumulative effects. The cumulative magnitude of change would therefore be **low**, which would result in **moderate-minor** and **not significant** cumulative effects.

7.7.115 In summary, there would be **no change** to the cumulative effects described in the baseline in the consented cumulative scenario, and a **moderate-minor** and **not significant** cumulative effect would arise in the application-stage cumulative scenario.



Viewpoint 10: B822/ B818, south east of Fintry

Baseline

- 7.7.116 The viewpoint is located on a pavement that runs alongside the B818 road, approximately 200m south east of the village of Fintry. The viewpoint is located 6.6km from the closest proposed wind turbine and the view is orientated east towards the Proposed Development. The view is representative of the views of road-users travelling eastbound between Fintry and Carron Valley.
- 7.7.117 The viewpoint is situated in the Middle Endrick Water LCT, which is characterised by a flat valley floor comprising livestock farmland and scattered settlement, and its wider setting that is influenced by the containing Fintry Hills and Campsie Fells on either side. Views are available down the valley to the south east and east in the direction of the Proposed Development and also to the north west, but there is screening from dense woodland that is situated to the south of the road, which provides a degree of enclosure that contains views to the south and west.
- 7.7.118 The landscape within the views generally possesses a traditional character, which is reflective of the historic estates that are located in the valley. The landscape within the valley is therefore characterised by livestock farmland and broadleaf woodlands, with a distant, weaker influence from the conifer plantation forests located in Carron Valley in the distance. There is also an influence from scattered settlement within the valley, which mainly comprises of farmsteads and clusters of residential properties, as well as some evidence of domestic scale wind turbine development on the hill side. There is however no existing influence from commercial scale wind farm development.

Sensitivity

- 7.7.119 The value of this view is high-medium. There is no formal viewpoint at this location, although the landscape within the view forms part of the Southern Hills LLA. The view of the valley is moderately scenic and as such the overall value is high-medium.
- 7.7.120 The susceptibility of road-users to the Proposed Development would be high-medium. Although this road is not a tourist route, some road users who are visiting are likely to have an expectation that they would experience views of the locally designated landscape when travelling, albeit these may be fleeting at times, and they would therefore have a high-medium susceptibility.
- 7.7.121 The combination of the value of the view and the susceptibility of viewers leads to an overall **high-medium** rating of sensitivity for road users.

Magnitude of Change

- 7.7.122 All four of the wind turbines would be theoretically visible to the east of this viewpoint from a minimum distance of 7.2km, with parts of the towers, and the hubs and blade tips of Turbines 2 and 3 theoretically visible, but landform would screen a larger proportion of Turbine 1 and 4 such that only a single blade tip is theoretically visible. In reality, there would be some additional screening to each of the turbines from the growing conifer plantation surrounding the Proposed Development, which would increase over the lifetime of the project until the next felling cycle. The proposed wind turbines would be contained within approximately 6° of the available HFOV. With the exception of the permanent anemometer mast, infrastructure and the borrow pit would generally be screened by landform and forestry, although tall cranes would be visible during the short-term construction and decommissioning



phases. The magnitude of change on this view would be **medium-low** for the following reasons:

- 7.7.123 While the vertical scale of the turbines is reduced to varying degrees by landform screening, a greater proportion of Turbines 2 and 3 would be visible.
- The Proposed Development is situated at a moderate distance from the viewpoint;
 - The proposed wind turbines would be visible above the skyline;
 - The Proposed Development would be situated on an area of hillside that is perceived to be at the head of the valley; and
 - Visibility of the permanent anemometer mast would add some additional complexity to the view.
- 7.7.124 Factors that moderate the magnitude of change are:
- The screening of the parts of the wind turbines by landform and forestry reduces the overall visibility and vertical impact of the wind turbines;
 - The compact design of the Proposed Development would affect a limited proportion (around 6°HFOV) of the view that is available from this viewpoint;
 - The Proposed Development would be situated beyond the settlement around Gonachan Cottage, Bogside Farm, and Fintry Kirk;
 - Although of a much smaller scale, there are two wind turbines visible in the wider view to the south-east of the viewpoint; and
 - The absence of visibility of infrastructure reduces the potential clutter associated with the Proposed Development.

Significance of Effect

- 7.7.125 The effect of the Proposed Development on road users would be **moderate** and **not significant**. This is due to a combination of the factors that lead to the low magnitude of change on the view and the medium-high sensitivity of the receptor.

Cumulative Effects

- 7.7.126 There is no theoretical visibility of consented or application-stage cumulative wind farms in this view, and therefore **no cumulative effects** would arise in either cumulative scenario.

Viewpoint 11: Stronend

Baseline

- 7.7.127 This viewpoint is located on Stronend (512m AOD), a high point on the Fintry Hills located at the northwest edge against the steep drop of the Gargunnock escarpment to the north and northeast. The viewpoint location is close to the small cairn of stones that encloses the trig point. It is accessed via a track that leads up the steep slopes of the incised Boquhan Burn from the minor road south of Kippen passing the Spout of Ballochleam.
- 7.7.128 Views to the south are across the moorland slopes of the Fintry Hills, of which this summit is a part. The glen in which the Endrick Water passes creates a break in the moorland plateau, beyond which, the pointed profile of Meikle Bin and the Campsie Fells are notable against the skyline along with the darker contrast of forestry found on the slopes around the Carron Valley Reservoir. Views to the west are along the



wooded lowlands of the Endrick Water, framed by the northern edges and scalloped ridge of the Campsie Fells, with Earl's Seat sitting up on this ridge of hills. The view west also contains a glimpse of the southern end of Loch Lomond near Drymen. Views to the north are across the Carse of Forth towards the Menteith Hills with the larger hilltops of the Loch Lomond and Trossachs National Park beyond, most notably the hill profiles of Ben Lomond, Ben Ledi and Ben Vorlich are distinctive features within the jagged backdrop. Views across the Carse of Forth are elevated and offer a scenic overview of the wooded and agricultural lowlands that follow this section of the River Forth. Flanders Moss stretches out across the centre of the view with the Lake of Menteith in the background. Views to the east are along the Gargunnoch escarpment and its large expanse of upland moorland that stretches eastwards across a series of successive gently sloped ridges. The operational Earlsburn and Earlsburn North wind farms sit across this moorland in the view east. To the south east, towards the Site, the upland moorland drops into the upper Endrick Water which provides views along the forested slopes of Earls Burn with the Craigengelt wind farm wrapping around these valley slopes.

- 7.7.129 The communication masts on Earl's Hill are clearly visible to the east. Operational wind farm development visible from this viewpoint include Earlsburn, Earlsburn North, Craigengelt, Tod Hill, Craigannet, Greendykeside and Braes of Doune.

Sensitivity

- 7.7.130 The value of this view is high-medium. There is no formal viewpoint at this location, however, it is located near a cairn which is a local destination for hill walkers in the area. The viewpoint is located within the Southern Hills LLA and views across this locally designated landscape, in addition to providing views towards the neighbouring Campsie Fells LLA.
- 7.7.131 The susceptibility of recreational walkers would be high. Recreational walkers are likely to visit the hill summit with some expectation to experience views of the locally designated landscapes.
- 7.7.132 The combination of the value of the view and the susceptibility of viewers leads to an overall **high** rating of sensitivity for recreational walkers.

Magnitude of Change

- 7.7.133 All four of the wind turbines would be theoretically visible to the south east of this viewpoint from a minimum distance of 7.0km, with varying parts of the towers, and the hubs and blade tips theoretically visible. While the lower thirds of the towers of Turbines 2 and 3 would be screened by landform, the majority of the towers of Turbines 1 and 4 would be screened such that only visibility of their hubs and blades would be apparent at this distance. The proposed wind turbines would be contained within approximately 2° of the available HFOV. Infrastructure and the borrow pit would be screened by landform, although tall cranes would be visible during the short-term construction and decommissioning phases. The magnitude of change on this view would be **low** for the following reasons:
- The Proposed Development is situated at a moderate distance from the viewpoint;
 - The proposed wind turbines would be visible above the skyline;
 - There would be instances of turbine stacking;
 - Visibility of the permanent anemometer mast would add some complexity while also extending the horizontal field of view affected by the Proposed Development; and



- The Proposed Development would extend the arc of visible wind farm development in the view associated with the Earlsburn and Craigengelt Wind Farms.

7.7.134 Factors that moderate the magnitude of change are:

- The screening of the parts of the wind turbines by landform reduces the overall visibility and vertical impact of the wind turbines;
- The compact design of the Proposed Development would affect a very narrow proportion (around 2°HFOV) of the view that is available from this viewpoint;
- The presence of operational wind turbines within a similar sector of the view, which ensures that the Proposed Development would not introduce a new characteristic element;
- The proposed turbines would be situated close to existing wind farm development, such that it would appear to form an extension to them, rather than a separate cluster;
- The Site appears to form part of the expansive and continuous uplands associated with the Fintry Hills, Kilsyth Hills, and Touch Hills, with the characteristics smaller scale valleys in the wider area largely screened by landform; and
- The absence of visibility of infrastructure reduces the potential clutter associated with the Proposed Development.

Significance of Effect

7.7.135 The effect of the Proposed Development on recreational hill walkers would be **moderate-minor** and **not significant**. This is due to a combination of the factors that lead to the low magnitude of change on the view and the high sensitivity of the receptor.

Cumulative Effects

7.7.136 In relation to the consented cumulative scenario, there is theoretical visibility of the consented Shelloch and Earlsburn Extension wind farms situated in the same sector of the view as the operational Earlsburn and Craigengelt Wind Farms. The introduction of these consented developments would intensify the characteristic influence of wind farms within these hills primarily due to the closer location and larger perceived scale of the Shelloch wind turbines (3.2km). The Proposed Development would be situated within a similar sector of the view to these wind farms, occupying a narrow extent of the view at a distance of 6.9km. The Proposed Development would therefore only have a modest cumulative interaction with other wind farms, and this would moderate the cumulative magnitude of change to **low**, which would result in a **moderate-minor** and **not significant** cumulative effect.

7.7.137 In relation to the application-stage cumulative scenario, the Drummarnock Wind Farm proposal would be discernible beyond other operational and consented wind farms at a distance of 10km. The Drummarnock wind turbines would therefore form a modest addition to the overall cumulative baseline, without altering the pattern of development as viewed from this location. The cumulative magnitude of change would therefore remain at a **low** level in the application-stage cumulative scenario, which would result in a **moderate-minor** and **not significant** cumulative effect.

7.7.138 In summary, the Proposed Development would result in **moderate-minor** and **not significant** cumulative effects in the consented and application-stage cumulative scenarios.



Viewpoint 12: Earl's Seat

Baseline

- 7.7.139 This viewpoint is located on Earl's Seat, a high point on the northern area of Campsie Fells close to the steep escarpment that drops down into the Carse of Forth to the north. The viewpoint location is close to the trig point and the nearby fence that aligns with the track. It is accessed from the A81 to the west, near the Glengoyne Distillery, via a long track that passes the steep slopes of Dumgoyne, before crossing the northern part of Campsie Fells (including Garloch Hill), following tracks east along the moorland close to the edges of the north facing escarpment.
- 7.7.140 Views to the south are largely occupied by the other parts of the Campsie Fells which spread across the view as a series of ridges separated by the incised burns of Finnglen and Ballagan. On a clear day the Glasgow conurbation can be seen in the lower lying landscape beyond the southern ridges of the Campsie Fells. To the west the view includes the northern summits of the Strathblane Hills including the rocky summit of Dumgoyne, which creates a distinctive intervening horizon to the lowlands beyond. The view north west includes the southern end of Loch Lomond near Drymen, the forested slopes of the Trossachs and the distinctive hills that form its mountainous backdrop, including Ben Lomond. Views to the north are across the Carse of Forth towards the Menteith Hills with the larger hilltops of the Loch Lomond and Trossachs National Park beyond, most notably the hill profiles of Ben Ledi and Ben Vorlich are distinctive features within the jagged backdrop. Views across the Carse of Forth are elevated and offer a scenic overview of the wooded and agricultural lowlands that follow this section of the River Forth, the small settlement of Balfron can be seen immediately below the escarpment. From this location, Flanders Moss stretches out across much of the Carse imbuing a lowland moorland context with occasional forested sections. Views to the east are dramatic and include other sections of the escarpment close to the viewpoint and an elevated view towards the Fintry Hills and Gargunnock escarpment further to the east. The scalloped edges of the escarpment and steep slopes creating a strong visual contrast to the lower lying Carselands below and to the north. The Endrick and Carron valleys combine in the view east and southeast creating a wide break in the otherwise large expanse of moorland in this view. The operational Earlsburn, Earlsburn North and Craigengelt wind farms sit across the moorland horizon in the view east and southeast. Also, to the southeast, towards the Site and along the Carron Valley, a small part of Loch Walton can be glimpsed with the forested slopes of Cairnoch Hill, where the Site is located, forming part of the backdrop to this view along the Carron Valley.
- 7.7.141 The communication masts on Earl's Hill are visible in the distance to the east. Operational wind development visible from this viewpoint include Earlsburn, Earlsburn North, Craigengelt, Tod Hill, Craigannet, Greendykeside and Braes of Doune.

Sensitivity

- 7.7.142 The value of this view is high-medium. There is no formal viewpoint at this location, however, Earls seat is the highest hill in the Campsie Fells and a popular destination. The viewpoint is located within the Southern Hills LLA and Campsie Fells LLA and has views across these locally designated landscapes. Hill walkers will have an appreciation of the surrounding landscape and will be focussed on views.



- 7.7.143 The susceptibility of recreational walkers would be high. Recreational walkers are likely to visit the hill summit with some expectation to experience views of the locally designated landscapes.
- 7.7.144 The combination of the value of the view and the susceptibility of viewers leads to an overall **high** rating of sensitivity for recreational walkers.

Magnitude of Change

- 7.7.145 All four of the wind turbines would be theoretically visible to the east of this viewpoint from a minimum distance of 12.5km, with parts of the towers, and hubs and blades theoretically visible. While the majority of the towers of Turbines 1, 2, and 3 would be visible, over half of Turbine 4's tower would be screened by landform. In reality, there would be some additional screening to each of the turbines from the growing conifer plantation surrounding the Proposed Development, which would increase over the lifetime of the project until the next felling cycle. The proposed wind turbines would be contained within approximately 5° of the available HFOV. Infrastructure, including the permanent met mast, access tracks, crane hardstandings, and substation compound, and the borrow pit would be visible to varying degrees depending on the maturity of the forestry, and tall cranes would be visible during the short-term construction and decommissioning phases. The magnitude of change on this view would be **medium-low** for the following reasons:
- The Proposed Development is situated over 12km from the viewpoint;
 - The proposed wind turbines would be partially visible above the skyline;
 - The Proposed Development would increase the intensity of wind farm development within a sector of the view that contains Craigengelt Wind Farm;
 - The permanent anemometer mast would be relatively indiscernible at distances of over 12km; and
 - The proposed turbines would appear larger in scale than those associated with the nearby Craigengelt and Earlsburn Wind Farms.
- 7.7.146 Factors that moderate the magnitude of change are:
- The screening of some parts of the turbines by landform reduces the overall visibility and vertical impact of some of the wind turbines;
 - The compact design of the Proposed Development would affect a very narrow proportion (around 5°HFOV) of the view that is available from this viewpoint;
 - The presence of operational wind turbines within a similar sector of the view, which ensures that the Proposed Development would not introduce a new characteristic element;
 - The proposed turbines would be situated within the same visual context as Craigengelt Wind Farm; and
 - The Site appears to form part of the expansive and continuous uplands associated with the Campsie Fells, Fintry Hills, and Kilsyth Hills, with the characteristic smaller scale valleys in the wider area largely screened by landform.

Significance of Effect

- 7.7.147 The effect of the Proposed Development on recreational hill walkers would be **moderate** and **not significant**. This is due to a combination of the factors that lead



to the medium-low magnitude of change on the view and the high sensitivity of the receptor.

Cumulative Effects

- 7.7.148 In relation to the consented cumulative scenario, there is theoretical visibility of the consented Shelloch and Earlsburn Extension wind farms situated in the same sector of the view as the operational Earlsburn Wind Farm. The introduction of these consented developments would intensify the characteristic influence of wind farms within these hills but would not materially alter the pattern of wind farm development as viewed from this location. The Proposed Development would be situated further to the south in a sector of the view containing the operational Craigengelt Wind Farm. The closer location and larger scale of the proposed turbines would further intensify the influence of wind farm development within this sector of the view. Altogether, the Proposed Development would only result in a **low** cumulative magnitude of change, which would result in a **moderate-minor** and **not significant** cumulative effect.
- 7.7.149 In relation to the application-stage cumulative scenario, the Drummarnock Wind Farm proposal would be discernible beyond the operational Craigengelt Wind Farm at a distance of 16.2km. The Drummarnock wind turbines would therefore form a modest addition to the overall cumulative baseline, without altering the pattern of development as viewed from this location. The larger scale of the Drummarnock wind turbines would help to moderate the vertical scale of the Proposed Development, which is higher than the operational Craigengelt wind turbines. The cumulative magnitude of change would therefore remain at a **low** level in the application-stage cumulative scenario, which would result in a **moderate-minor** and **not significant** cumulative effect.
- 7.7.150 In summary, the Proposed Development would result in **moderate-minor** and **not significant** cumulative effects in the consented and application-stage cumulative scenarios.

Viewpoint 15: Dumyat

Baseline

- 7.7.151 This viewpoint is located on the summit of Dumyat (419m AOD), which is located on the south western edge of the Ochil Hills. The summit of Dumyat can be accessed by recreational walkers by various routes, but the most popular routes are from Pendreich Forest car park to the west and an alternative route from Blairlogie to the south west at the foot of the Ochils. The walking routes primarily follow established paths, which are well-used all year round. Views from the summit provide vast panoramas over the Forth valley to the south and west, and beyond to the Touch Hills to the south-west and the Trossachs to the north west, while views to the north and north east encompass the Ochil Hills.
- 7.7.152 Views to the south west towards the Proposed Development are characterised by the juxtaposition of the diverse landscape of the Forth valley, which is situated beyond the Ochil foothills, and the distant Touch Hills. The Forth valley is densely settled and it is punctuated by some notable landmarks, including The Wallace Monument and Stirling Castle, and larger developments, such as Stirling University and industrial buildings associated with the settlement of Stirling. The Touch Hills beyond the Forth Valley are relatively sparsely settled by contrast and are characterised by a simpler landcover, which is characterised more subtly by areas of forestry and operational wind farm developments. Views to the north west contain far-reaching views towards the impressive, albeit distant Loch Lomond and



Trossachs mountain peaks of Ben Lomond, Ben Venue, Ben Ledi, and Ben Vorlich, which contrast with the flat carse in the midground. Views to the south-east are also far-reaching across the carselands of the Forth and the Firth of Forth, with views extending beyond to the Lothians. Views to the north and north-east are characterised by the rounded hills of the Ochils, which possess a distinctive landcover of open moorland at higher elevations and a mixture of moorland and parcels of forestry at lower elevations.

- 7.7.153 The character of the surrounding landscape varies greatly across the panorama, and the value of the views are drawn in part from the juxtaposition between the settled carselands and the surrounding hills, which, while only possessing modest wildness characteristics, contrast starkly with the lowlands. Wind farm development is however a relatively common characteristic in parts of the surrounding uplands, albeit distant and of a relatively small perceived scale due to the expansiveness of the wider landscape. In particular, the broad landform of the Touch and Gargunnock Hills are punctuated by the Earlsburn and Craigengelt Wind Farms, and the Braes of Doune Wind Farm is apparent in views towards the Trossachs.

Sensitivity

- 7.7.154 The value of this view is high. While the summit of Dumyat is not a formal viewpoint, it is a popular location for recreational walkers to experience elevated views of the surrounding landscape. The presence of a bench close to the summit of the hill reinforces the high level of value associated with this viewpoint at the local level, as does the presence of multiple paths providing access to it.
- 7.7.155 The susceptibility of recreational walkers would be high. Recreational walkers are likely to visit the hill summit with an expectation to experience views of the locally designated Ochil landscape and the surrounding lowlands.
- 7.7.156 The combination of the value of the view and the susceptibility of viewers leads to an overall **high** rating of sensitivity for recreational walkers.

Magnitude of Change

- 7.7.157 All four of the wind turbines would be theoretically visible to the east of this viewpoint from a minimum distance of 17.8km, with some of the towers, and hubs and blades theoretically visible. While a large proportion of the towers of Turbines 1, 2, and 3 would be visible, Turbine 4's tower and hub would be screened by landform such that only part of a blade would be theoretically visible. The proposed wind turbines would be contained within approximately 5° of the available HFOV. With the exception of the permanent anemometer mast, infrastructure, including the access tracks, crane hardstandings, and substation compound, and the borrow pit would be screened by landform, while tall cranes would be visible during the short-term construction and decommissioning phases. The magnitude of change on this view would be **low** for the following reasons:
- The Proposed Development is situated at long range from the viewpoint;
 - The proposed turbines would be situated within a sector of the view which contains Stirling Castle and the Wallace Monument;
 - The Proposed Development would slightly increase the intensity of wind farm development within a sector of the view that contains Craigengelt and Earlsburn Wind Farms;
 - The proposed turbines would appear marginally larger in scale than those associated with the nearby Craigengelt and Earlsburn Wind Farms;



- The Proposed Development would reduce the existing separation between the operational Craigengelt and Earlsburn Wind Farms;
- While Turbines 3 and 4 would integrate into the operational cluster of wind turbines associated with Craigengelt Wind Farm, Turbine 2 would appear as a slight outlier situated in between Craigengelt and Earlsburn Wind Farms; and
- The permanent anemometer mast would be relatively indiscernible at distances of over 17km.

7.7.158 Factors that moderate the magnitude of change are:

- The screening of some parts of the wind turbines by landform reduces the overall visibility and vertical impact of some of the wind turbines;
- The compact design of the Proposed Development would affect a very narrow proportion (around 5°HFOV) of the view that is available from this viewpoint;
- The presence of operational wind turbines within a similar sector of the view, which ensures that the Proposed Development would not introduce a new characteristic element;
- The proposed turbines would be situated within the same visual context as Craigengelt and Earlsburn Wind Farms;
- The proposed turbines are situated in a sector of the view that contains considerable development in the landscape between the viewpoint and the Site; and
- The proposed wind turbines would be sited in a broad and large-scale upland landscape context.

Significance of Effect

7.7.159 The effect of the Proposed Development on recreational hill walkers would be **moderate-minor** and **not significant**. This is due to a combination of the factors that lead to the low magnitude of change on the view and the high sensitivity of the receptor.

Cumulative Effects

7.7.160 In relation to the consented cumulative scenario, there is theoretical visibility of the consented Shelloch and Earlsburn Extension wind farms situated in the same sector of the view as the operational Earlsburn Wind Farm above the Touch Hills. The introduction of these consented developments would intensify the characteristic influence of wind farms on these hills but would not materially alter the pattern of wind farm development as viewed from this location. The Proposed Development would be situated further to the south, occupying a position in between the Earlsburn wind farm cluster and the Craigengelt Wind Farm. The larger scale of the proposed wind turbines would be discernible and this would increase the cumulative magnitude of change, but the intervening distance would also help to moderate these effects. Altogether, the Proposed Development would only result in a **low** cumulative magnitude of change, which would result in a **moderate-minor** and **not significant** cumulative effect.

7.7.161 In relation to the application-stage cumulative scenario, the Drummarnock proposal would be apparent in front of the operational Craigengelt Wind Farm at a distance of 14.2km. The larger scale of the Drummarnock wind turbines would make the cluster of turbines more apparent, without altering the pattern of development as viewed from this location. The Proposed Development would introduce wind



turbines in between the Craigengelt/ Drummarnock cluster and the Earlsburn cluster, which would increase the cumulative magnitude of change, but the intervening distance and the larger scale of the Drummarnock wind turbines would also help to moderate these effects. The cumulative magnitude of change would remain at a **low** level in the application-stage cumulative scenario, which would result in a **moderate-minor** and **not significant** cumulative effect.

- 7.7.162 In summary, the Proposed Development would result in **moderate-minor** and **not significant** cumulative effects in the consented and application-stage cumulative scenarios.

Viewpoint 18: Carron Valley Hamlet, by Reservoir Dam

Baseline

- 7.7.163 The viewpoint is located by the dam situated at the south-eastern corner of Carron Valley Reservoir, opposite the row of houses in the hamlet of Carron Valley. The view is therefore representative of those experienced by residents who live in the houses nearby, but also road users of the B818 road which passes through the hamlet.
- 7.7.164 There are open views to the south-west across Carron Valley Reservoir from the viewpoint, which extend across the reservoir to the valley's containing hills, including the more defined summit of Meikle Bin. The hills are generally characterised by their conifer forestry landcover, with some more elevated summits characterised by a simpler, open moorland landcover. Views to the north west and north east are characterised by the row of white semi-detached houses of the Carron Valley hamlet, and a backdrop characterised by the livestock farmed hill slopes. A jetty is also situated in the foreground to the north west of the viewpoint, which enables recreational sailing on the reservoir.
- 7.7.165 There is currently only some very limited theoretical visibility of two wind turbine blades associated with Craigengelt Wind Farm above the ridgeline to the north east of the view. In reality, these wind turbine blades are not visible and consequently do not influence the character of the view.

Sensitivity

- 7.7.166 The value of this view is high-medium. There is no formal viewpoint at this location, but the location does provide residents with scenic views of the Carron Valley Reservoir. The viewpoint and landscape within the views also form part of the locally designated Southern Hills LLA and Kilsyth Hills SLA.
- 7.7.167 The susceptibility of residents would be high. Residents would be able to appreciate the view for long periods either walking across the hamlet or from the curtilage of nearby properties, and as such their susceptibility is high.
- 7.7.168 The combination of the value of the view and the susceptibility of viewers leads to an overall **high** rating of sensitivity for residents.

Magnitude of Change

- 7.7.169 Turbines 2, 3 and 4 would be theoretically visible to the north west of this viewpoint from a minimum distance of 1.7km, with landform screening visibility of Turbine 1. Landform would also screen the towers and hubs of Turbines 3 and 4, and the near entirety of Turbine 2. In reality, there would be only some limited interruption to the view provided by the telegraph line in the foreground of the view, while Turbine 2 is likely to be indiscernible. The proposed wind turbines would be contained within approximately 8° of the available HFOV. With the exception of the permanent



anemometer mast, infrastructure would be screened by landform, although tall cranes would be visible during the short-term construction and decommissioning phases. The magnitude of change on this view would be **medium-low** for the following reasons:

- The Proposed Development is situated at close range;
- The Proposed Development would bring movement and contrasting colour and texture to the affected section of the view;
- Given the screening to large parts of the wind turbines, visibility of only some of the moving parts may produce a complex visual image;
- The degree of contrast between the wind turbines and the smaller scale traditional farmland and residential properties in the view;
- Only a very short section of the permanent anemometer mast would be visible; and
- The view would be experienced by static viewers residing in the nearby properties.

7.7.170 Factors that moderate the magnitude of change are:

- The screening of large parts of the turbines by landform reduces the overall visibility and vertical impact of the Proposed Development;
- The Proposed Development would affect a limited proportion (around 8°HFOV) of the view that is available from this viewpoint;
- The turbines are clearly situated beyond the immediate farmland landscape, with the separation emphasised by the absence of visible turbine towers; and
- The absence of visibility of infrastructure reduces the potential clutter associated with the Proposed Development.

Significance of Effect

7.7.171 The effect of the Proposed Development on residents would be **moderate** and **significant**, due to the close range of the view, the perceived scale of the wind turbine blades, and their movement which would be apparent above the skyline. This is due to a combination of the factors that lead to the medium-low magnitude of change on the view and the high sensitivity of the receptor.

Cumulative Effects

7.7.172 There is no theoretical visibility of consented or application-stage cumulative wind farms in this view, and therefore **no cumulative effects** would arise in either cumulative scenario.

Assessment of Effects on Visual Receptors

7.7.173 The second part of the assessment of effects on views is the assessment of the effects that the Proposed Development would have on the views from principal visual receptors. The principal visual receptors considered in the assessment include settlements and route corridors (including roads, walking routes and national cycle routes) all of which are shown on **Figure 7.5**, and shown in conjunction with the ZTV on **Figures 7.11a-b**. The principal visual receptors assessed in detail have been selected as they have potential to undergo significant effects as a result of the Proposed Development. A preliminary assessment to identify these receptors has been carried out through the use of ZTVs and wirelines



to indicate the extents, level and nature of theoretical visibility and site work to determine the extents, level and nature of actual visibility. This process has identified the following principal visual receptors as requiring detailed assessment:

- Settlements – Fintry and Balfron;
- Roads - B818 and B822; and
- Core paths – 9078, NL/1/1, NL/10/1, NL/6/1, and NL/7/1.

Fintry

Baseline

- 7.7.174 The village of Fintry, with a population of approximately 700, is situated 6.8km west of the Proposed Development. The village contains some services for the local community, including a primary school, a sports club, a village hall, a community hub, an inn, and a church. The village is positioned on the floor of the Endrick Water valley, with ribbon development associated with the B818 and B822 roads. Views from the village are therefore relatively contained by the surrounding hills, with more far-reaching views available up and down the valley in a south-east and north-west direction. Nevertheless, the hills and valley provide a scenic backdrop from much of the village. However, there is some considerable screening from woodland, including riparian woodland associated with the Endrick Water, that either entirely screens or interrupts views from large parts of the settlement.

Sensitivity

- 7.7.175 Settlements are accorded a high sensitivity as visual receptors due to the residential nature of viewers, and Fintry is therefore considered to have a **high** sensitivity.

Magnitude of Change

- 7.7.176 The ZTVs (see **Figures 7.6c** and **7.7c**) indicate theoretical visibility of the Proposed Development across southern parts of the village including Main Street, Dunmore Gardens and Fintry Sports and Recreation Club, but there would be no visibility of the Proposed Development further north across the following locations: Culcreuch Avenue, including Fintry Primary School, Menzies Avenue, Menzies Terrace, Menzies Crescent, and Menzies Drive.
- 7.7.177 In reality, visibility of the Proposed Development from buildings along Main Street and Dunmore Gardens would be largely constrained by intervening buildings due to the street's orientation and also tree vegetation, and as such the greatest potential for views is likely to be experienced at the south-eastern edge of the village where a few properties (Ashburn, Camustianvaig, and Abriachan) would experience open views towards the Site at distances of between 7-8km. Residents of these few properties would typically experience views containing larger parts of Turbines 2 and 3, similar to that predicted at Viewpoint 10 (B822, south-east of Fintry) (albeit at slightly greater distance). A **medium-low** magnitude of change is therefore predicted to these views experienced by a small number of the residents of Fintry. Views from the nearby community hub and bowling green are likely to be interrupted to a degree by intervening trees and the Ashburn property, reducing the magnitude of change at these locations to either a **negligible** level or **no change**.
- 7.7.178 Where theoretical visibility is predicted to the north of Main Street around Fintry Sports and Recreation Club, visibility of the Proposed Development in reality would be screened by intervening trees and woodland. As a result, **no change** is predicted to views experienced by residents located at the sports club.



- 7.7.179 Fintry Kirk is located approximately 1km south east of the village where theoretical visibility of the proposed wind turbines is predicted. Views from Kirk would also typically experience views containing parts of Turbines 2 and 3, similar to that predicted at Viewpoint 10 (B822, south east of Fintry) (albeit at slightly shorter distance), but there would be some partial screening to parts of the wind turbines by intervening deciduous woodland. A **medium-low** magnitude of change is therefore predicted to these views experienced by visitors to the Kirk.

Significance of the Effect

- 7.7.180 The effect of the Proposed Development on views from Fintry would be at worst **moderate** and **not significant** when experienced from a few of the properties at the south eastern edge of the village and Fintry Kirk, but there would be **no change** in reality to views experienced across the majority of the village due to a combination of an absence of theoretical visibility and screening from intervening buildings and woodland.

Cumulative Effects

- 7.7.181 There is no theoretical visibility of consented or application-stage cumulative wind farms across this settlement, and therefore **no cumulative effects** would arise in either cumulative scenario.

Balfron

Baseline

- 7.7.182 The village of Balfron, with a population of approximately 2,140, is situated 13.3km west of the Proposed Development. The village contains some services for the local community, including shops, a health centre, a village hall, schools, a church, a fire station, police station, garage, and a golf course. The village is positioned on the transition between the Rolling Valley Farmland - Lower Endrick Water, Rolling Valley Farmland - Middle Endrick Water, and Moorland Plateau - Kippen Muir LCTs. As a consequence, the undulating landform has a varied aspect. These undulating slopes present some opportunities for views outwith the settlement, but due to the relatively shallow gradients, they tend to be interrupted by either buildings or woodland, such that views are contained to the elevated ridges of distant hills.

Sensitivity

- 7.7.183 Settlements are accorded a high sensitivity as visual receptors due to the residential nature of viewers, and Balfron is therefore considered to have a **high** sensitivity.

Magnitude of Change

- 7.7.184 The blade tip ZTVs (see **Figures 7.6c-d**) indicate theoretical visibility of the Proposed Development across large parts of Balfron with the exception of the lower valley areas surrounding the Clachan Burn. On review of the hub height ZTVs (see **Figures 7.7c-d**), large proportion of this theoretical visibility across the north of the settlement is limited to blade tips, with theoretical visibility of generally one hub, and only occasionally two hubs, predicted across the southern and north-western areas of the settlement at distances of approximately 14-15km.
- 7.7.185 In reality, it is predicted that there is unlikely to be visibility of any of the wind turbines in any views from within the settlement due to the extent of woodland screening across the village and surrounding area. As a result, it is likely that there would be **no change** to the views. In the event that any visibility does occur an at worst



negligible magnitude of change is predicted to arise across any affected parts of the settlement.

Significance of the Effect

- 7.7.186 It is predicted that there would be **no effect** on views from Balfron due to the extent of woodland screening, but in the unlikely event that views are experienced the effects experienced by residents would be at worst **minor** and **not significant**.

Cumulative Effects

- 7.7.187 There is no theoretical visibility of consented or application-stage cumulative wind farms across this settlement, and therefore no cumulative effects would arise in either cumulative scenario.

B818

Baseline

- 7.7.188 The B818 connects the towns of Denny in the east of the Study Area to Killearn in the west, via Carron Valley. The route is approximately 30km long with travellers generally oriented east or west. It is noteworthy that the B818 shares a section of road with the B822 between Fintry and Gonachan Cottage, and while this assessment considers this section of road separately in relation to the two different sets of receptors, when drawing conclusions in relation to the totality of landscape and visual effects, it will be necessary not to duplicate these effects.
- 7.7.189 There is widespread theoretical visibility along the section of the route between Ballinkinrain in the west and Carron Bridge in the east, and only scattered patches of theoretical visibility at greater distances along the route. These potentially affected sections therefore form the focus of this assessment.

Sensitivity

- 7.7.190 The value of views from the B818 is medium to high-medium. There are no formal viewpoints along the relevant sections of the B818, but for the majority of the route it passes through locally designated landscapes. The scenic value of the road is primarily influenced by the rural countryside that the road passes through, which is influenced by the road's position for much of the route along the floor of various valleys, and the surrounding hills.
- 7.7.191 The susceptibility of road-users to the Proposed Development would vary between medium-low and high-medium depending on the purpose of the road user's journey.
- 7.7.192 The combination of the value of the views and the susceptibility of viewers leads to an overall medium to **high-medium** rating of sensitivity.

Magnitude of Change

- 7.7.193 An assessment of the visual effects, including cumulative effects, of the Proposed Development on a section of the B818 is provided in the assessment of Viewpoint 10 (B822/ B818, south-east of Fintry) (**Figure 7.26**) earlier in the Assessment of Effects on Viewpoints, where effects would be moderate and not significant. In relation to cumulative effects, there would no change under the consented and application scenarios and therefore no cumulative visual effect is predicted in either scenario. The effects described in relation to Viewpoint 10 are generally representative of those that would be experienced along the section of this road between Fintry and Gonachan Cottage.



- 7.7.194 There are also other sections of this route that are predicted to experience theoretical visibility of the Proposed Development, including a section in the Upper Endrick Valley near Spittalhill, a section between Todholes Farm and Kirk o' Muir Cemetery, a section between Craigannet and Carron Bridge, and a section to the south-west of Carron Glen.
- 7.7.195 At distances of between 4-5km, the Proposed Development would introduce visibility of larger scale, closer wind turbines along affected sections of the road in the Upper Endrick Valley, near Spittalhill. Taking into account the general absence of visibility of Turbine 1, it is envisaged that there would be a **medium** magnitude of change to views experienced by road users travelling eastbound along this section of the road.
- 7.7.196 Along the closest section of the B818 road in between Todholes Farm and Kirk o' Muir Cemetery, the proposed wind turbines would intermittently appear as large scale elements where forestry does not provide intervening screening at distances of between 1-3km. As a result, the magnitude of change to views along this section of the route when travelling both eastbound and westbound is likely to vary between **high** and **no change** depending on the level of screening provided by the surrounding forestry.
- 7.7.197 A representative assessment of the visual effects, including cumulative effects, of the Proposed Development's effects on views experienced by road users between Craigannet and Carron Bridge is provided in the assessment of Viewpoint 3 (Carron Valley Forestry Commission Car Park) (**Figure 7.19**) earlier in the Assessment of Effects on Viewpoints, where the magnitude of change would be **low**. It is envisaged that effects along this section of the route at distances of between 1-3km would be relatively similar to those experienced at Viewpoint 3.
- 7.7.198 In relation to the section of the B818 to the south-west of Carron Glen, theoretical visibility of the Proposed Development would be limited to blade tips at distances of 5-7km, which would be viewed in the context of the operational Craigengelt Wind Farm. As a result, a **negligible** magnitude of change is predicted to views experienced by road users along this section of the route.

Significance of the Effect

- 7.7.199 The effect of the Proposed Development on road users of the B818 would be highly variable ranging from **major** and **significant** along its closest sections between Todholes Farm and Kirk o' Muir Cemetery, reducing slightly to **major-moderate** and **significant** along the affected section in the Upper Endrick Valley, to **moderate-minor** and **negligible** and **not significant** along sections between Craigannet and Carron Bridge and south-west of Carron Glen respectively. Along all other sections of the route there would be **no change** to existing views.

Cumulative Effects

- 7.7.200 In relation to the consented cumulative scenario, there would be some short sections of the road where theoretical cumulative visibility with the Earlsburn Extension and Shelloch wind farms is predicted. The Proposed Development and Earlsburn Extension would be theoretically visible on the hills to the north of the road (beyond the operational Earlsburn Wind Farm) within a broad arc of view along a section of road that passes Todholes Farm around the north western edge of Carron Valley Reservoir. Where open views of the Proposed Development and Earlsburn Extension can be experienced by road users, the cumulative magnitude of change would be **medium**, but it is also likely that along the eastern part of this section of the road views would be screened by commercial forestry on the lower slopes of Cairnoch Hill, and this would moderate the magnitude of cumulative



effects to lower levels. Theoretical cumulative visibility is also predicted at greater distances from a 2km section of the road south of Carron Glen, where theoretical visibility of the Proposed Development is very limited. As such, a **negligible to low** cumulative magnitude of change is predicted along this stretch of the road. Theoretical cumulative visibility with Shelloch would extend across an approximately 5.5km stretch of the road between Todholes Farm and Kirk o' Muir Cemetery, primarily along the northern shoreline of Carron Valley Reservoir. In reality, cumulative visibility of Shelloch from sections of the road along the shoreline of the reservoir is likely to be screened by conifer forestry, while more open views to the north around Todholes Farm, where Shelloch would appear to extend the arc of the view affected by wind farm development, are likely to be subject to **medium** cumulative magnitude of change.

- 7.7.201 In relation to the application-stage cumulative scenario, there are several short sections of the road that are predicted to experience theoretical cumulative visibility containing the Proposed Development and Drummarnock Wind Farm. Along the majority of these sections to the south and south-west of the Proposed Development, only blade tips of the Drummarnock wind turbines would be visible and consequently only a **negligible** cumulative magnitude of change is predicted. Conversely, where more of the Drummarnock wind turbines are visible along sections of the road to the south of Carron Glen, the Proposed Development would have a weak influence upon the view, and this would also moderate the cumulative magnitude of change to a **negligible to low** level.
- 7.7.202 In summary, where cumulative visibility is predicted to arise, the Proposed Development would result in **minor to moderate** and **not significant** cumulative effects on views experienced by users of the B818 in the consented scenario, and **minor to moderate-minor** and **not significant** cumulative effects in the application-stage scenario.

B822

Baseline

- 7.7.203 The B822 connects the towns of Torrance in the south west of the Study Area to Callander in the north. The route is approximately 42km long with travellers generally oriented north when travelling from Torrance to Callander and south when travelling from Callander to Torrance. It is noteworthy that the B822 shares a section of road with the B818 between Fintry and Gonachan Cottage, and while this assessment considers this section of road separately in relation to the two different sets of receptors, when drawing conclusions in relation to the totality of landscape and visual effects, it will be necessary not to 'double count' these effects.
- 7.7.204 Given the general absence of any theoretical visibility along sections of the road to the south of the Study Area, between Clachan of Campsie and Torrance, and the north of the road, between Fintry and Callander, the relevant sections of the road for the purposes of this assessment are those between Fintry and Clachan of Campsie, where theoretical visibility is intermittent.
- 7.7.205 Effects from one of the potentially most affected sections of this route are illustrated by Viewpoint 10 (B822, south east of Fintry) (**Figures 7.21a-e**).

Sensitivity

- 7.7.206 The value of views from the B822 is medium-low to high-medium. There are no formal viewpoints along the relevant sections of the B822, but some sections are situated within a locally designated landscape. The scenic value of the road is primarily influenced by the rural countryside that the road passes through, which is



influenced by the road's position for much of the route along the floor of Campsie Glen and the Endrick Water valley, and the surrounding hills.

- 7.7.207 The susceptibility of road-users to the Proposed Development would vary between medium-low and high-medium depending on the purpose of the road user's journey.
- 7.7.208 The combination of the value of the views and the susceptibility of viewers leads to an overall **medium to high-medium** rating of sensitivity.

Magnitude of Change

- 7.7.209 An assessment of the visual effects, including cumulative effects, of the Proposed Development on a section of the B822 is provided in the assessment of Viewpoint 10: B822/ B818, south east of Fintry (**Figure 7.26**) earlier in the Assessment of Effects on Viewpoints, where effects would be **moderate** and **not significant**. In relation to cumulative effects, there would be no change under the consented and application scenarios and therefore **no cumulative visual effect** is predicted in either scenario. The effects described in relation to Viewpoint 10 are generally representative of those that would be experienced along the section of this road between Fintry and Gonachan Cottage.
- 7.7.210 There is another section of this route located to the south-east of Viewpoint 10 on Campsie Muir, approximately 3.5km in length, which is predicted to receive theoretical visibility of the proposed turbines. At distances of between 5-8km from the Proposed Development, when travelling northbound, all four of the proposed wind turbines would be visible to varying degrees due to the relatively open views that can be experienced by road users. The wind turbines would typically be seen together with the slightly more distant operational turbines associated with the Earlsburn Wind Farm. Given the affected horizontal field of view (see **Figure 7.8**) experienced at distances of between 5-7km from the Proposed Development, and visibility of parts of their towers, and their hubs and blades, a **medium** magnitude of change is predicted along these sections of the route. At distances of between 7-8km from the Proposed Development, the magnitude of change to views would reduce slightly to a **medium-low** level due to the increased level of screening to turbine towers and the majority of Turbine 1.

Significance of the Effect

- 7.7.211 The effect of the Proposed Development on road users of the B822 would be at worst **moderate** and **significant** where a medium magnitude of change would be experienced, but this would reduce to **moderate** and **not significant** effects where a lower magnitude of change is predicted along other sections of the route.

Cumulative Effects

- 7.7.212 In relation to the consented cumulative scenario, theoretical cumulative visibility of the Proposed Development with Earlsburn Extension and Shelloch is predicted to arise along sections of the road at Campsie Muir. The levels of cumulative visibility would vary along these affected parts, but where more elevated, open views are available, the Earlsburn Extension and Shelloch wind farms would appear to consolidate and slightly extend the existing Earlsburn Wind Farm cluster, and the Proposed Development would be situated in between this cluster and the more distant Craigengelt wind turbines. The Proposed Development would therefore reduce the separation between the existing wind farm clusters, and this would increase the cumulative magnitude of change. These cumulative effects would tend to reduce in magnitude at lower elevations where levels of cumulative visibility reduce due to screening from intervening landform. Overall, it is considered that the



- cumulative magnitude of change to views along affected sections of the road would vary between a **low and medium-low** level.
- 7.7.213 In relation to the application-stage cumulative scenario, blade tips of the Drummarnock wind turbines would be theoretically visible above the Cairnoch Hill ridgeline, and therefore given the intervening distance, the cumulative magnitude of change is likely to remain between a **low and medium-low** level.
- 7.7.214 In summary, the Proposed Development would result in **moderate-minor to moderate** and **not significant** cumulative effects in the consented and application-stage cumulative scenarios.

Core Paths

Baseline

- 7.7.215 The preliminary assessment identified that the following core paths have the potential to be significantly affected by the Proposed Development: 9078, NL/1/1, NL/10/1, NL/6/1, and NL/7/1. These core paths are all located within the local context of the Proposed Development and their locations are illustrated on **Figure 7.11a-b**.

Sensitivity

- 7.7.216 Core paths are identified by local authorities to provide members of the public reasonable access throughout their area, and as a result they are of medium value.
- 7.7.217 Users of the core paths will have an appreciation of the surrounding landscape and its contribution to views that can be experienced from the routes. The surrounding landscape contains evidence of human influences, such as commercial forestry and wind farms, and as a consequence this is likely to moderate their susceptibility to change in views. Overall, the susceptibility to change of core path users is therefore considered to be high-medium.
- 7.7.218 In combining the medium value with the high-medium susceptibility, the sensitivity of users of core paths is considered to be **high-medium**.

Magnitude of change

- 7.7.219 Stirling's 9078 core path passes between Ballochleam, north of Lees Hill, and Cringate, north west of the Site. Theoretical visibility is predicted along the majority of its length between Cringate and the Spout of Ballochleam, while no visibility is predicted further north along the section of the path that dissects the escarpment between the Fintry and Gargunnock Hills (see **Figure 7.6c-d**). The closest section of the Core Path is situated approximately 750m from the closest proposed wind turbine, and as a consequence while there is considerable landform screening to the majority of Turbine 3 and the whole of Turbine 4, the proposed wind turbines would appear as large scale, prominent elements, which would result in a **high** magnitude of change to views. Effects of a similar magnitude would be experienced by recreational walkers up to approximately 1km from the Proposed Development, before the magnitude of change would be moderated slightly to **high-medium** at distances of between 1-2km as a result of the intervening distance, the narrow field of view affected (see **Figure 7.8**), and visibility of the operational Earlsburn wind turbines. At distance of between 2-3km from the Proposed Development, the magnitude of change to views would reduce further to **medium**, before reducing to between **medium-low** and **low** at distances of 3-5km.
- 7.7.220 North Lanarkshire's NL/1/1 core path is situated approximately 500m south east of the Carron Valley Forest Car Park, extending approximately 1km along the Carron



Valley Reservoir shoreline. There is theoretical visibility of between three and four of the turbines along the route (see **Figure 7.6c-d**) with considerable landform screening to some of the turbine towers and from some sections of the path the whole of Turbine 1 (see **Figure 7.7c-d**). However, there would be theoretical visibility of the majority of Turbine 3 from much of the route and this would have a large contribution to the magnitude of change experienced along this route. Overall, it is considered that a **medium** magnitude of change is likely to arise intermittently along the core path which is dependent on the level of screening present from occasional trees and vegetation.

- 7.7.221 North Lanarkshire's NL/10/1 core path connects Black Hill, just south of Carron Valley Forest, to Cairnbog Farm, just north of Queenzieburn. Theoretical visibility of the Proposed Development is predicted along approximately 1.5km of the core path, primarily along a stretch to the west of Laird's Hill at distances of approximately 5-6km. From this section of the route, the Proposed Development would be apparent on Cairnoch Hill (with only limited screening from landform to lower tower sections) in between the slightly more distant Craigengelt and Earlsburn Wind Farms. As a result, the proposed wind turbines would increase the perceived connection between these wind farms, which would inflate the magnitude of change upon the view. Overall, a **medium** magnitude of change is likely to arise along the potentially affected sections of the route.
- 7.7.222 North Lanarkshire's NL/6/1 core path is situated along the southern edge of the Carron Valley Forest, passing over the summits of Tomtain, Garrell Hill and Black Hill, and extending to approximately 6.5km in length. Theoretical visibility would be relatively widespread along its length, although there may be some screening from nearby conifer forestry. An assessment of the visual effects, including cumulative effects, of the Proposed Development on an eastern section of the path is provided in the assessment of Viewpoint 6 (Tomain) (**Figure 7.22**) earlier in the Assessment of Effects on Viewpoints, where the magnitude of change would be **medium**. On western sections of the path, the effects of the Proposed Development would be similar to those experienced from the nearby NL/10/1 core path, where the Proposed Development would be apparent on Cairnoch Hill in between the slightly more distant Craigengelt and Earlsburn Wind Farms. As a result, the proposed wind turbines would increase the perceived connection between these wind farms, and the magnitude of change would also be **medium**.
- 7.7.223 North Lanarkshire's NL/7/1 core path follows Tak Ma Doon Road from North Lanarkshire's boundary with Falkirk to Kilsyth. There is only short section of the core path that would receive theoretical visibility and that is located at Viewpoint 8. An assessment of the visual effects, including cumulative effects, of the Proposed Development on an eastern section of the path is provided in the assessment of Viewpoint 8 (Tak Ma Doon Road) (**Figure 7.24**) earlier in the Assessment of Effects on Viewpoints, where the magnitude of change would be **low**.

Significance of the Effect

- 7.7.224 In summary, while the Proposed Development would have a varied influence on views experienced on different sections of the core paths (within 5km of the Proposed Development) included in the detailed assessment, visual effects assessed to occur across part or the whole of the length of the following core paths: 9078, NL/1/1, NL/10/1, NL/6/1 would be **significant**. Effects along North Lanarkshire's NL/7/1 core path would be **not significant**.



7.8 Assessment of Visible Aviation Lighting

- 7.8.1 This section contains the assessment of aviation lighting effects upon receptors in the night-time environment and considers the proposed embedded mitigation measures outlined earlier in the LVIA. It is supported by various figures and visualisations, which are referenced in the text.
- 7.8.2 The assessment of night-time visual effects is based on clear night-time conditions, and on the use of reduced 200cd intensity aviation lights only, rather than 2000cd intensity, in accordance with NatureScot's Guidance on Aviation Lighting Impact Assessment (2024). Further information relating to the parameters of the assessment is provided in the earlier 'Aviation Lighting Assessment' section of the 'Methodology for the Assessment of Effects' section of this LVIA.
- 7.8.3 It is important to remember that for the majority of visual receptors, the effect arising from aviation lighting is likely to be gained over a relatively short period. Views from within properties are likely to be restricted by the use of window coverings, particularly in winter, and properties within settlements are likely to be affected by baseline lighting of streetlights. As a result, people who experience views at night are frequently those using the road network, whose adaptation to darkness is compromised by dashboard and car headlights such that this group of receptors will not perceive the wind turbine lighting at its highest intensity. Remote rural locations, hilltops and footpaths are generally visited infrequently at night and the number of people affected would be low.

Turbine Lighting Visibility

- 7.8.4 **Table 7-13** provides a summary of the potential visibility of nacelle lights for each of the LVIA viewpoints, this is based on the nacelle light ZTV (**Figure 7.15**) and details of how many lit wind turbines would be theoretically visible from each of the viewpoints included in the LVIA.

Table 7-13 Turbine Lighting Visibility at Viewpoints

No.	Viewpoint	Nacelle Lighting Theoretical Visibility
1	Sir John de Graham's Castle	3
2	Carron Valley Reservoir Long Distance Path	3
3	Carron Valley Forestry Commission Car Park	1
4	Carron Valley Reservoir Shore Trail	3
5	Minor road near Easter Cringate Cottage	4
6	Tomtain	4
7	Meikle Bin	4
8	Tak Ma Doon Road	3
9	New Line Road, near Easter Buckieburn	3
10	B822 South East of Fintry	2
11	Stronend	4
12	Earl's Seat	4
13	Stirling Castle	1
14	Wallace Monument	1



No.	Viewpoint	Nacelle Lighting Theoretical Visibility
15	Dumyat	3
16	Lodge Forest Visitor Centre Aberfoyle	1
17	Ben Ledi	4
18	Carron Valley Hamlet, by Reservoir Dam	1

Turbine Lighting Intensity

In addition to dimming mitigation, a reduction in lighting intensity may also be achieved through vertical directional intensity mitigation. This is achieved through the use of a light that emits a reduced lighting intensity dependent on the degree of the vertical angle of view from the light relative to landform. The lighting intensity ZTV (**Figure 7.16**) illustrates the different lighting intensities across the surrounding landscape, based on the CEL-WT-MIC light model. It is important to note that the vertical directional intensity mitigation information is provided as an illustrative example, and the Applicant has not committed to using this specific light fitting, as this choice is normally made at turbine procurement stage. Many of the viewpoints within the areas closest to the Proposed Development can benefit from reduced intensity as a result of the negative vertical angle in which the nacelle lights would be viewed. **Table 7-14** below provides a summary of the reduced intensity for the nacelle lights based on the light intensity data presented on **Figure 7.16**.

Table 7-14: Turbine Lighting Intensity (Candela) at Viewpoints

No.	Viewpoint	Turbine Lighting Intensity (cd)		
		Vertical Angle	2000cd	200cd
1	Sir John de Graham's Castle	-6.18	<133	<13
2	Carron Valley Reservoir Long Distance Path	-4.07	<133	<13
3	Carron Valley Forestry Commission Car Park	-5.9	<133	<13
4	Carron Valley Reservoir Shore Trail	-4.81	<133	<13
5	Minor road near Easter Cringate Cottage	-1.94	1055 to 409	106 to 41
6	Tomtain	0.45	2028 to 2054	203 to 205
7	Meikle Bin	1.9	2054 to 1113	205 to 111
8	Tak Ma Doon Road	-1.53	1055 to 409	106 to 41
9	New Line Road, near Easter Buckieburn	-2.52	409 to 206	41 to 21
10	B822 South East of Fintry	-2.92	409 to 206	41 to 21
11	Stronend	0.85	2028 to 2054	203 to 205
12	Earl's Seat	0.78	2028 to 2054	203 to 205
13	Stirling Castle	-1.81	1055 to 409	106 to 41
14	Wallace Monument	-1.44	1055 to 409	106 to 41
15	Dumyat	0.03	2028 to 2054	203 to 205
16	Lodge Forest Visitor Centre Aberfoyle	-0.89	2028 to 1055	203 to 106
17	Ben Ledi	0.99	2028 to 2054	203 to 205
18	Carron Valley Hamlet, by Reservoir Dam	-6.62	<133	<13



- 7.8.5 It is evident from **Figure 7.16** that the full intensity of the lights would only be theoretically experienced when on similar or more elevated terrain.
- 7.8.6 Elevated areas within 5km of the Proposed Development, and to a lesser extent within 10km, include parts of the Gargunnock, Fintry, and Kilsyth Hills and the Campsie Fells, which surround the Proposed Development. In parts of these areas the vertical angles are between 0° and 1° resulting in an approximate light intensity of between 203 cd and 205 cd when visibility >5km. Noting that the light intensity could be higher for the 0° to 1° vertical angle, where the highest candela value calculated by Contarnex for the CEL-WT-MIC aviation warning light was recorded (for a vertical angle of 0.6°) as 2206 cd when visibility <5km and up to 221 cd when visibility >5km. In other parts of the surrounding area, the intensity of lights would often appear reduced due to the lower elevation of the landscape within valleys and across the undulations of lower lying upland slopes, particularly from immediately to the south and west across Carron Valley Reservoir and its shoreline, and from large areas of the hills the lighting would not be apparent due to landform screening. Where lighting is visible, effects across these surrounding areas within 10km of the Proposed Development are likely to be relatively marked though due to the current low levels of baseline light pollution (see **Figure 7.14**). These effects would however be moderated in the event that the consented Shelloch wind farm (and the Drummarnock Wind Farm proposal) is built, due to the presence of existing aviation lighting within the local landscape.
- 7.8.7 In the majority of parts of the Detailed Study Area at distances of between 5-15km, there is no theoretical visibility of the aviation lights, and as such there would be no effects on the night-time environment.
- 7.8.8 At distances of over 14-15km from the Proposed Development, where some widespread visibility of aviation lighting is predicted, primarily across the north east, east, and south east of the Detailed Study Area, a light intensity of between 106 – 205 cd is predicted, but it is likely that effects would be moderated by distance, as well as the higher levels of baseline light pollution experienced by visual receptors situated within settlements in these areas (see **Figure 7.14**).

Assessment of Representative Night-time Viewpoints

Viewpoint 5: Minor road near Easter Cringate Cottage

- 7.8.9 The sensitivity of this viewpoint is likely to reduce from 'high to high-medium' to **high-medium** for residents and road users. This slight reduction in their susceptibility relates to the reduced ability of residents and road users to appreciate distant landscape patterns and the diminished scenic qualities of the view in darkness.
- 7.8.10 The baseline night-time view towards the Proposed Development is characterised by the rural landscape, which possesses high levels of darkness and an absence of any lighting (see **Figure 7.21i-j**). As a consequence, the view is defined by the horizon, which is formed by hills in the midground and the background of the view. The ridgelines are relatively smooth, but in parts it is shaped subtly by the conifer forestry and occasional trees on these hills. The baseline light pollution figure (**Figure 7.14**) illustrates that the light levels in this part of the Study Area are generally between 0.0 - 0.1 Radiance 10-9 W/cm² *sr, which represents some of the lowest levels of light pollution in the Detailed Study Area.
- 7.8.11 Four turbine lights would be theoretically visible from a minimum of 2.3km away, contained within 40° of the available HFOV. The vertical angle between this



- viewpoint and the closest nacelle is -1.94° and the intensity of the nacelle lights, based on the CEL-WT-MIC light model, would therefore be between 106 - 41 cd (see **Figure 7.16**).
- 7.8.12 The Proposed Development would introduce a new influence of fixed red lights across part of the sky in the night-time view. The position of the lights within the currently dark sky and the absence of intervening landform would increase their effect on the view, as would the flashing appearance that would be likely to arise. The magnitude of change arising from the lighting is further influenced by the absence of baseline lighting; the relatively wide affected HFOV of the lighting extending intermittently across approximately 40° of the view; and the short distance between the viewpoint and the Proposed Development.
- 7.8.13 Overall, it is considered that the night-time magnitude of change on this view would be **high**. As a result, when combined with the receptor's high-medium sensitivity, the effect of the aviation lighting on residents and road users is considered to be **major** and **significant**.
- 7.8.14 There are no hubs visible of consented wind farms that are predicted to be theoretically visible from this location, and as a result there would be **no cumulative effect** associated with aviation lighting under the consented cumulative scenario.
- 7.8.15 Visibility of lighting associated with two of the proposed Drummarnock wind turbines at closer distances of approximately 1km would be apparent however, and as a consequence cumulative effects would arise within the application-stage cumulative scenario. The lights associated with the Drummarnock wind turbines would be apparent within a different, but fairly narrow, sector of the view, and therefore the Proposed Development would extend the influence of aviation lighting into other wider views from this location. Overall, it is anticipated that a **medium** cumulative magnitude of change would arise in the application-stage cumulative scenario, which would result in **moderate** and **significant** night-time effects.

Viewpoint 9: Minor Road, near Easter Buckieburn

- 7.8.16 The sensitivity of this viewpoint is likely to reduce from 'high to high-medium' to **high-medium** for residents and road users. This slight reduction in their susceptibility relates to the reduced ability of residents and road users to appreciate distant landscape patterns and the diminished scenic qualities of the view in darkness.
- 7.8.17 The baseline night-time view towards the Proposed Development is characterised by the rural landscape, which possesses high levels of darkness and an absence of any lighting (see **Figure 7.25g-h**). As a consequence, the view is defined by the horizon, which is formed by hills in the midground and the background of the view. The character of the ridgelines is shaped by the conifer forestry and trees on these hills. The baseline light pollution figure (**Figure 7.14**) illustrates that the light levels in this part of the Study Area are generally between 0.0 - 0.1 Radiance 10^{-9} W/cm² *sr, which represents some of the lowest levels of light pollution in the Detailed Study Area.
- 7.8.18 Three turbine lights would be theoretically visible from a minimum of 4.7km away, contained within 10° of the available HFOV. The vertical angle between this viewpoint and the closest nacelle is -2.52° and the intensity of the nacelle lights, based on the CEL-WT-MIC light model, would therefore be between 41 - 21 cd (see **Figure 7.16**).
- 7.8.19 The Proposed Development would introduce a new influence of fixed red lights across part of the sky in the night-time view. The position of the lights within the currently dark sky would increase their effect on the view, as would the flashing



- appearance that would be likely to arise, while the screening from intervening landform to one of the lights helps to moderate the effects. The magnitude of change arising from the lighting is further influenced by the absence of baseline lighting; the relatively narrow affected HFOV of the lighting extending intermittently across approximately 10° of the view; and the medium range distance between the viewpoint and the Proposed Development.
- 7.8.20 Overall, it is considered that the night-time magnitude of change on this view would be **medium**. As a result, when combined with the receptor's high-medium sensitivity, the effect of the aviation lighting on residents and road users is considered to be **moderate** and **significant**.
- 7.8.21 There are no hubs visible of consented wind farms that are predicted to be theoretically visible from this location, and as a result there would be **no cumulative effect** associated with aviation lighting under the consented cumulative scenarios.
- 7.8.22 Visibility of lighting associated with three of the proposed Drummarnock wind turbines at distances of approximately 2.2km would be apparent however, and as a consequence cumulative effects would arise within the application-stage cumulative scenario. The lights associated with the Drummarnock wind turbines would be apparent within a similar sector of the view, and therefore the Proposed Development would intensify the influence of aviation lighting within the view from this location. Overall, it is anticipated that a **medium-low** cumulative magnitude of change would arise in the application-stage cumulative scenario, which would result in **moderate** and **not significant** night-time effects.

Viewpoint 10: B822, south-east of Fintry

- 7.8.23 The sensitivity of this viewpoint is likely to remain high-medium for residents and road users.
- 7.8.24 The baseline night-time view towards the Proposed Development is characterised by the rural landscape, which possesses high levels of darkness and an absence of any lighting (see **Figure 7.26f-g**). As a consequence, the view is defined by the horizon, which is formed by hills in the midground and the background of the view. The character of the ridgelines is shaped by the conifer forestry and trees, and occasional rocky landform on these hills. The baseline light pollution **Figure (Figure 7.14)** illustrates that the light levels in this part of the Study Area are generally between 0.0 - 0.1 Radiance 10-9 W/cm² *sr, which represents some of the lowest levels of light pollution in the Detailed Study Area.
- 7.8.25 Two wind turbine lights would be theoretically visible from a minimum of 7.6km away, contained within 40° of the available HFOV. The vertical angle between this viewpoint and the closest nacelle is -2.92° and the intensity of the nacelle lights, based on the CEL-WT-MIC light model, would therefore be between 41 - 21 cd (see **Figure 7.16**).
- 7.8.26 The Proposed Development would introduce a new influence of fixed red lights across part of the sky in the night-time view. The position of the lights within the currently dark sky would increase their effect on the view, as would the flashing appearance that would be likely to arise, while the screening from intervening landform to two of the lights helps to moderate the effects. The magnitude of change arising from the lighting is further influenced by the absence of baseline lighting; the relatively narrow affected HFOV of the lighting extending intermittently across approximately 2° of the view; and the medium range distance between the viewpoint and the Proposed Development.
- 7.8.27 Overall, it is considered that the night-time magnitude of change on this view would be **medium**. As a result, when combined with the receptor's high-medium



sensitivity, the effect of the aviation lighting on residents and road users is considered to be **moderate** and **significant**.

- 7.8.28 There are no hubs visible of consented or application-stage wind farms that are predicted to be theoretically visible from this location, and as a result there would be **no cumulative effect** associated with aviation lighting under the consented and application-stage cumulative scenarios.

Night-time Assessment of LVIA Viewpoints

- 7.8.29 Whilst lighting visualisations have only been produced for three of the LVIA viewpoints, an assessment has been carried out for the other LVIA viewpoints, see **Table 7-15**. This assessment is based on the information provided in **Tables 7-13** and **7-14** and where appropriate draws on the detailed assessments carried out for the representative viewpoints.
- 7.8.30 As described in **Technical Appendix 7.1** LVIA Methodology, the susceptibility of visual receptors differs at night reflecting the different activities people undertake during the hours of darkness. For example, drivers using roads at night tend to be more focused on the road and the area illuminated by headlights than during the day and may have oncoming headlights or other reflective signage and dashboard lighting drawing their attention, and affecting an individual's dark adaptation, resulting in lower susceptibility. On the other hand, people taking part in activities where darkness is essential, such as stargazing, are of higher susceptibility. It should also be noted that where existing cumulative developments have moderated susceptibility for some viewpoints during the day, that this would not necessarily apply to receptors susceptibility at night, and as a result susceptibility and potentially sensitivity may increase. The assessment therefore takes account of this difference in susceptibility for receptors at night compared with during the day and receptor sensitivity at night is recorded in **Table 7-15**.

Table 7-15: Night-time Assessment of LVIA Viewpoints

No.	Viewpoint	Receptor sensitivity at night	Magnitude of change	Significance of Effect
1	Sir John de Graham's Castle	High-medium	High	Major and Significant
2	Carron Valley Reservoir Long Distance Path	High-medium	High	Major and Significant
3	Carron Valley Forestry Commission Car Park	High-medium	High	Major and Significant
4	Carron Valley Reservoir Shore Trail	High-medium	High	Major and Significant
5	Minor road near Easter Cringate Cottage*	High-medium	High	Major and Significant
6	Tomtain	High-medium	High	Major and Significant
7	Meikle Bin	High-medium	High	Major and Significant
8	Tak Ma Doon Road	High-medium	Medium-low	Moderate and Significant
9	Minor Road, near Easter Buckieburn*	High-medium	Medium	Moderate and Significant
10	B822/ B818, south-east of Fintry*	High-medium	Medium	Moderate and Significant



No.	Viewpoint	Receptor sensitivity at night	Magnitude of change	Significance of Effect
11	Stronend	High-medium	Medium	Moderate and Significant
12	Earl's Seat	High-medium	Medium	Moderate and Significant
13	Stirling Castle*	Medium	Negligible	Minor and Not significant
14	Wallace Monument	Medium	Negligible	Minor and Not significant
15	Dumyat	High-medium	Low	Moderate-minor and Not significant
16	Lodge Forest Visitor Centre Aberfoyle	High-medium	Low	Moderate-minor and Not significant
17	Ben Ledi	High-medium	Low	Moderate-minor and Not significant
18	Carron Valley Hamlet, by Reservoir Dam	Medium	High-medium	Moderate and Significant

7.8.31 The duration of the effect of the lights on receptors is likely to be over a relatively short period, more commonly experienced during evening and morning hours of darkness, around dusk and sunrise. The ICAO standard requires the lights to be switched on 30 minutes after sunset, and 30 minutes before sunrise, removing the likelihood of visible lighting during twilight. The effect of the Proposed Development's visible aviation lighting at night would also be limited by the activity of receptors at night. Receptors that experience views at night are generally limited to residents of settlements, rural properties and motorists using the road network. Views from within properties are also likely to be restricted by the use of window coverings, particularly in winter (it should be noted that this was not a factor of consideration in the assessment). The assessment of night-time effects is based on clear nighttime viewing conditions. At dusk and sunrise, it may be possible to identify the formation of the wind turbines with the lighting switched on, but only in conditions of good and excellent visibility. At sunrise it may also be possible, in views from the west, to see the wind turbines with lights switched on whilst backlit by the rising sun. Views from remote uplands and hills, rural farmland and footpaths etc. are visited infrequently at night therefore numbers of receptors affected would be low.

7.8.32 At night, whilst the four proposed aviation lights would be visible from the surrounding landscape, the wind turbines themselves would not be visible during the hours of darkness. Nevertheless, the assessment of night-time effects for the Proposed Development has predicted significant effects for some of the viewpoints. Significant effects resulting from the visible aviation lighting are likely to arise at viewpoints 1-12, and 18. As mentioned previously, these effects would be moderated in the event that the consented Shelloch wind farm (and the Drummarnock Wind Farm proposal) is built, due to the presence of existing aviation lighting within the local landscape.

7.9 Summary of Predicted Effects and Statement of Significance

7.9.1 The potential effects on the landscape and visual receptors that would arise as a result of the Proposed Development have been assessed in this chapter. The process taken involved identifying those receptors within the Study Area with the



potential to be significantly affected. The significance of these effects has been assessed through combining the sensitivity of each receptor with a prediction of the magnitude of change that would occur as a result of the Proposed Development. The findings of the assessment are presented in **Table 7-16**.

- 7.9.2 Where possible these effects have been mitigated by reducing the number and scale of the wind turbines and increasing the separation distances of the wind turbines from residential dwellings. While emphasis has also been placed on designing a relatively small, compact wind farm that is set back from the more sensitive shores of Carron Valley Reservoir, located within the more developed uplands situated to the north of the reservoir. This has resulted in a wind farm with a linear design composition that reflects the simple characteristics of the Cairnoch Hill ridgeline, and also the broader orientation of the valley. The removal of tower aviation lighting and the implementation of dimming and vertical directional intensity mitigation would also reduce effects during night-time.
- 7.9.3 In summary, the assessment has shown that the effect of the Proposed Development on the landscape and visual resource of the great majority of this Study Area would be not significant, which means that for the great majority of the Study Area, and the receptors that lie within it, the effect of the Proposed Development is not defining and the existing, baseline characteristics of the landscape and views will continue to prevail. The receptors that would not be significantly affected by the Proposed Development in isolation include the following:
- National Parks and National Scenic Areas;
 - Wild Land Areas;
 - The great majority of the landscape character types that are found within the Study Area;
 - Residents of cities, towns and villages;
 - Travellers on National Cycling Routes; and
 - Travellers on railway lines.
- 7.9.4 While the effect on the majority of the Study Area would be not significant, as described above, the LVIA has indicated that there is potential for the Proposed Development to result in some localised significant effects on the area that lies in closer proximity to the Site. The LVIA has identified that there is potential for significant effects to arise upon the following receptors:
- The landscape character of the Site and some of its surroundings, including parts of the Forested River Basin - Carron Valley, Lowland Hills - Fintry, Gargunnock and Touch Hills, and Rugged Moorland Hills LCTs;
 - A small number of the SLQs of the Southern Hills LLA and the Kilsyth Hills SLA;
 - Views experienced by residents of the hamlet of Carron Valley and those from a small number of the closest residential properties (see **Technical Appendix 7.2: RVAA** for details);
 - Views experienced by recreational walkers from some hill summits, notably Tomtain and Meikle Bin;
 - Views experienced by road users along some of the closest sections of the B818 and B822 roads;
 - Views experienced by recreational users of sections of the following core paths: EK/1439/1, EK/1444/1, EK/1455/1, IV18, and IV19;



- Views experienced during daytime by residents, road users, and recreational walkers, at Viewpoints 1, 2, 4, 5, 6, 7, and 18; and
- Views experienced at night-time by residents and road users at Viewpoints 1-12 and 18 as a consequence of aviation lighting when considering the existing baseline, which does not include the consented Shelloch Wind Farm.

7.9.5 In addition to these effects arising as a result of the Proposed Development in isolation, there are also likely to be some significant cumulative effects upon the following receptors:

- Parts of the landscape character of the Lowland Hills - Fintry, Gargunnock and Touch Hills LCT unit, the Forested River Basin - Carron Valley LCT unit, the Rugged Moorland Hills LCT unit, and the Lowland Hills – Central LCT unit in the consented and application-stage cumulative scenarios where conifer forestry does not provide a strong degree of enclosure;
- Views experienced by recreational walkers from Viewpoint 4 (Carron Valley Reservoir Shore Trail), 6 (Tomtain), and 7 (Meikle Bin) in the consented and application-stage cumulative scenarios; and
- Views experienced by residents and road users from Viewpoint 5 (Minor road, near Easter Cringate Cottage) in the application-stage cumulative scenario only.

7.9.6 The significant cumulative effects summarised above relate to the additional landscape and visual effects of the Proposed Development in the context of different baseline scenarios that make assumptions about existing and proposed wind farms, rather than the combined effects of all of the relevant wind farms on the landscape and/ or visual receptors. In relation to potential combined effects, it is considered that the Proposed Development in itself would not alter the current perception of the local landscape possessing a 'landscape with wind farms' characteristic, particularly when viewed from Carron Valley. The cumulative consented and application-stage scenarios would further intensify this characteristic (primarily as a result of the introduction of Shelloch, Earlsburn Extension and Drummarnock), with the perception of a 'landscape with wind farms' generally being maintained across the Detailed Study Area.

7.9.7 This summary indicates that the Proposed Development would result in some localised significant effects on aspects of the landscape and visual resource at distances of up to approximately 6-7km from the Proposed Development. It is considered that these effects would be likely to be comparable in nature if micro-siting is undertaken within a 50m distance of the current wind turbine locations.

7.9.8 It is important to note, however, that assessments of this type tend to focus on those locations and receptors where significant effects may arise, and there are large parts of the Detailed Study Area where ZTVs show that there would be no visibility, or limited visibility, of the Proposed Development, including those receptors that are listed above.

Table 7-16: Summary of Predicted Effects

Receptor	Significant Effect?
Conifer Plantation Forestry Landscape Element	No
3. Forested River Basin - Carron Valley	Yes (localised)
7d. Lowland Hills - Fintry, Gargunnock and Touch Hills	Yes (localised)
216. Rugged Moorland Hills	Yes (localised)
7c. Lowland Hills - Campsie Fells	No



Receptor	Significant Effect?
149. Lowland Hills – Central	No
2. Rolling Valley Farmland - Middle Endrick Water	No
2. Rolling Valley Farmland - Lower Endrick Water	No
Southern Hills LLA	Yes (on three SLQs)
Kilsyth Hills SLA	Yes (on one SLQ)
Denny Hills SLA	No
Campsie Fells LLA	No
Viewpoint 1: Sir John de Graham's Castle	Yes (daytime and night-time)
Viewpoint 2: Carron Valley Reservoir Long Distance Path	Yes (daytime and night-time)
Viewpoint 3: Carron Valley Forestry Commission Car Park	Yes (night-time only)
Viewpoint 4: Carron Valley Reservoir Shore Trail	Yes (daytime and night-time)
Viewpoint 5: Minor road near Easter Cringate Cottage	Yes (daytime and night-time)
Viewpoint 6: Tomtain	Yes (daytime and night-time)
Viewpoint 7: Meikle Bin	Yes (daytime and night-time)
Viewpoint 8: Tak Ma Doon Road	Yes (night-time only)
Viewpoint 9: Easter Buckieburn	Yes (night-time only)
Viewpoint 10: B822, south-east of Fintry	Yes (night-time only)
Viewpoint 11: Stronend	Yes (night-time only)
Viewpoint 12: Earl's Seat	Yes (night-time only)
Viewpoint 15: Dumyat	No
Viewpoint 18: Carron Valley Hamlet, by Reservoir Dam	Yes (daytime and night-time)
Fintry	No
Balfron	No
B818	Yes (localised)
B822	Yes (localised)
9078	Yes (localised)
NL/1/1 Core Path	Yes (localised)
NL/10/1 Core Path	Yes (localised)
NL/6/1 Core Path	Yes (localised)
NL/7/1 Core Path	No

7.10 Abbreviations List

Abbreviation	Meaning
AOD	Above Ordnance Datum
CAA	Civil Aviation Authority
cd	Candela
EIA	Environmental Impact Assessment
GDL	Gardens and Designed Landscapes
GIS	Geographic Information Systems
km	kilometer
LCT	Landscape Character Type
LLA	Local Landscape Area
LLTTNP	Loch Lomond and The Trossachs National Park



Abbreviation	Meaning
LVIA	Landscape and Visual Impact Assessment
m	metre(s)
NCR	National Cycle Routes
NPF4	National Planning Framework 4
NSA	National Scenic Area
NatureScot's LCA	NatureScot's National Landscape Character Assessment (2019)
OS	Ordnance Survey
RVAA	Residential Visual Amenity Assessment
SLSCS	Stirling Landscape Sensitivity and Capacity Study
SLA	Special Landscape Area
SLQ	Special Landscape Quality
WLA	Wild Land Area
ZTV	Zone of Theoretical Visibility

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Making Sustainability Happen



Chapter 8: Ecology

Environmental Impact Assessment Report

Cairnoch Hill Wind Farm

3 August 2026



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8.0 Ecology

8.1 Introduction

- 8.1.1 This chapter identifies, describes and assesses the likely impacts and effects (as per the 'Environmental Impact Assessment (EIA) Regulations¹) on ecological features arising during construction and operation of the proposed Cairnoch Hill Wind Farm ("the Proposed Development"). The assessment of decommissioning effects has been scoped out of detailed consideration in this chapter (see **Chapter 6: Scoping and Consultation** and Section 8.7 of this chapter for more detail).
- 8.1.2 The content within this chapter considers habitats and non-avian animal species. Effects on birds are considered separately within **Chapter 9: Ornithology**. Together **Chapter 8** and **Chapter 9** provide an assessment of the potential likely significant effects of the Proposed Development on biodiversity.
- 8.1.3 The specific objectives of the chapter are to:
- Describe the current baseline;
 - Describe the assessment methodology and significance criteria used in completing the impact assessment;
 - Describe the potential significant effects, including direct, indirect and cumulative effects;
 - Describe the mitigation measures proposed to address any likely significant effects; and
 - Assess the residual effects remaining following the implementation of mitigation and compensation measures and identify biodiversity enhancements.
- 8.1.4 This chapter is supported by the following Technical Appendices:
- **Technical Appendix 8.1: Desk study;**
 - **Technical Appendix 8.2: UK Habitat Classification (UKHab) and National Vegetation Classification (NVC) Report;**
 - **Technical Appendix 8.3: Protected Mammals Report;**
 - **Technical Appendix 8.4: Bat Survey Report;**
 - **Technical Appendix 8.5: Fish Habitat Survey Report (with appended fish population survey); and**
 - **Technical Appendix 8.6: Outline Habitat Management Plan (HMP).**
- 8.1.5 A Shadow Habitats Regulations Appraisal (HRA) is provided separately and should be read alongside this chapter.
- 8.1.6 As interrelationships exist between the assessment of effects on ecology and certain other disciplines, reference should also be made to the following chapters of the EIA Report:
- **Chapter 3: Description of the Development;**

¹ The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended).



- **Chapter 9: Ornithology; and**
- **Chapter 10: Hydrology, Hydrogeology, Geology and Soils.**

8.1.7 This chapter is supported by the following Figures, which are provided within the relevant Technical Appendices:

- **Figure 8.1.1: Statutory Designated Sites within 10km;**
- **Figure 8.1.2: Non-statutory Designated Sites within 2km;**
- **Figure 8.2.1: UK Habitat Survey;**
- **Figure 8.2.2: NVC Survey;**
- **Figure 8.2.3: Potential GWDTEs;**
- **Figure 8.3.1: Riparian Protected Species Survey;**
- **Figure 8.3.2: Terrestrial Protected Species Survey (Confidential);**
- **Figure 8.3.3: Great Crested Newt Habitat Suitability Index Survey;**
- **Figure 8.4.1: Ground Level Tree Assessment;**
- **Figure 8.4.2: Bat Activity Survey Detector Locations;**
- **Figure 8.5.1: Fish Utilisation Potential;**
- **Figure 8.5.2: Salmonid Spawning Potential;**
- **Figure 8.5.3: Electrofishing Survey Locations;**
- **Figure 8.6.1: Outline Habitat Management Plan;**

8.1.8 Throughout this chapter, scientific species names are presented when first referenced, followed by common names only thereafter.

Legislation, Policy and Guidance

8.1.9 **Table 8-1** summarises the legislation, policy and guidance relevant to the non-avian ecology assessment and details how their requirements have been considered within the context of this chapter.

8.1.10 An appraisal of the Proposed Development's compliance with relevant policy is given in the separate, standalone Planning Statement provided as part of the planning application.

Table 8-1: Summary of Relevant Legislation, Policy and Guidance with regard to Ecology

Legislation / Policy / Guidance	Consideration within the EIA Report
Legislation	
The Conservation (Natural Habitats &c.) Regulations 1994 (as amended) ('The Habitats Regulations')	Full details on how this legislation relates to ecological features considered within this chapter can be found in the relevant technical appendices (Technical Appendices 8.1 - 8.6) and/or within this chapter to inform the assessment.
Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (which underpins The Habitats Regulations)	
Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017	
The Wildlife and Countryside Act 1981 (as amended)	



Legislation / Policy / Guidance	Consideration within the EIA Report
The Wildlife and Natural Environment (Scotland) Act 2011 (as amended) (WANE Act)	
Nature Conservation (Scotland) Act 2004 (as amended)	
The Protection of Badgers Act 1992 (as amended)	
Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003	
Policy	
National Planning Policy	
National Planning Framework 4 (NPF 4): Policy 3 (Biodiversity) intends to protect biodiversity, reverse biodiversity loss, deliver positive effects and strengthen nature networks. Policy 4 (Natural Places) intends to protect, restore and enhance natural assets, including European sites and other statutory protected sites, making best use of nature-based solutions. Policy 5 (Soils) intends to protect carbon-rich soils, restore peatlands and minimise disturbance to soils from development. Policy 6 (Forestry, Woodland and Trees) intends to protect and expand forests, woodland and trees.	Embedded and good practice mitigation measures that would be applied to reduce potential impacts and effects on ecological features are outlined in Section 8.5. Habitat compensation and biodiversity enhancement measures, which include native woodland establishment, and how these would be delivered, are summarised in Section 8.7 with further details provided in the Outline Habitat Management Plan (Technical Appendix 8.6: Outline HMP). Impacts on European sites is considered within the Shadow HRA Report and within this chapter. Impacts of forestry and information regarding compensatory woodland planting are provided in Technical Appendix 3.2: Forestry.
Scottish Government Planning Guidance: Biodiversity This guidance outlines the Scottish Ministers' expectations for implementing NPF4 policies which support the cross-cutting NPF4 outcome 'improving biodiversity'.	
The Scottish Biodiversity Strategy to 2045: The Scottish Biodiversity Strategy was developed around the ambition for Scotland to restore and regenerate biodiversity across the country by 2045, driving a sustainable economy and supporting thriving communities for which nature stewardship is a key focus. To achieve this, the Strategy highlights six main objectives: 1. Accelerate restoration and regeneration; 2. Protect nature on land and at sea, across and beyond protected areas; 3. Embed nature positive farming, fishery and forestry; 4. Protect and support the recovery of vulnerable and important species and habitats; 5. Invest in nature; and 6. Take action on indirect drivers of biodiversity loss.	
Scottish Biodiversity List (SBL) The SBL is a list of species and habitats important to furthering the conservation of biodiversity, as required by the Nature Conservation (Scotland) Act 2004.	Habitats and species listed within the SBL that occur (or have potential to occur) within the Site are summarised in Section 8.4, with further details provided in Technical Appendices 8.1-8.5. Mitigation to reduce potential impacts to such habitats and species is outlined in Section 8.5,



Legislation / Policy / Guidance	Consideration within the EIA Report
	with compensation and enhancement measures detailed in Section 8.7 and Technical Appendix 8.6: Outline HMP .
Local Planning Policy	
Stirling Local Development Plan 2018	Primary Policies 1, 8, 12 and 13, and policies 4.2, 8.1, 8.2 and 10.1 have been considered throughout the design process to minimise effects on biodiversity within the Site.
Supplementary Guidance, Wind Energy Developments, Stirling Council 2019 ²	Assessment of direct, indirect and cumulative impacts of the Proposed Development on natural heritage (including the water environment and carbon rich soils) is provided in Section 8.7.
Stirling Council Alive with Nature Plan 2021-2045 ³	Measures to deliver benefits to biodiversity and maximise the carbon sequestration potential of the natural environment, under the enhancement objective, are provided in Technical Appendix 8.6: Outline HMP and summarised in Section 8.7.
Technical Guidance	
Chartered Institute of Ecology and Environmental Management (CIEEM) (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Version 1.3 - updated September 2024 ⁴ .	The CIEEM guidelines form the basis of the impact assessment presented within this Chapter, refer to Section 8.3 for further details of the assessment methodology.
CIEEM (2019) Advice Note: On the Lifespan of Ecological Reports and Surveys ⁵ .	Addressed in Technical Appendices 8.1 – 8.5 .
NatureScot (2026). Advising on Peatland, Carbon-rich Soils and Priority Peatland Habitats in Development Management ⁶ .	The presence of, and approach to, peatland and carbon rich soils are addressed in Technical Appendix 10.1: Peat Landslide Hazard Risk Assessment (PLHRA) and Technical Appendix 10.2: Outline Soils and Peat Management Plan . Maps showing the distribution of peat within the

² Stirling Council. (2019). Supplementary Guidance: Wind Energy Developments. [Online] Available at: [wind-energy-sg-february-2019.pdf](https://www.stirling.gov.uk/media/10000/Supplementary-Guidance-Wind-Energy-Developments-February-2019.pdf)

³ Stirling Council. (2021). Alive with Nature Plan 2021-2024. [Online] Available at: [alive-with-nature-plan-2021-45.pdf](https://www.stirling.gov.uk/media/10000/alive-with-nature-plan-2021-45.pdf)

⁴ CIEEM. (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. [Online] Available at: <https://cieem.net/resource/guidelines-for-ecological-impact-assessment-ecia/>

⁵ CIEEM. (2019). Advice note on the Lifespan of Ecological Reports and Surveys. [Online] Available at: <https://cieem.net/resource/advice-note-on-the-lifespan-of-ecological-reports-and-surveys/>

⁶ NatureScot. (2026). Advising on peatland, carbon-rich soils and priority peatland habitats in development management. [Online] Available at: <https://www.nature.scot/doc/advising-peatland-habitats-and-carbon-rich-soils-development-management>



Legislation / Policy / Guidance	Consideration within the EIA Report
	Site are provided in Figures 10.5–10.7 . Further details relating to peatland and carbon rich soils within the Site (soil type, peat depth and peat classification) are also provided in Chapter 10: Hydrology, Hydrogeology, Geology and Soils .

Technical Competencies

- 8.1.11 This assessment has been carried out by Rowan Smith, BSc (Hons) MSc. Rowan has over 6 years' experience in Ecology, in both ecological consultancy and research sectors. She has a broad environmental science background and particular expertise in aquatic and riparian ecology, experience includes undertaking survey design, baseline surveys and assessment of potential impacts due to development and post construction monitoring. Rowan has worked closely on a number of wind farms and other large scale energy infrastructure projects and has authored several EIA/EcIA chapters and Habitats Regulations Appraisals.
- 8.1.12 The assessment has been technically reviewed by Duncan Watson BSc (Hons), MSc, CEnv, MCIEEM. Duncan is an Ecologist with over 28 years' professional experience covering the following areas: Environmental Impact Assessment (EIA); Ecological Surveys and Impact Assessment; Habitats Regulations Assessment; Habitat Creation/Management and Ecological Mitigation and Monitoring. He has particular experience in the energy sector having played a key role in the EIAs for over 80 onshore wind farms across the UK and Ireland. Duncan has a particular interest in Ecological Impact Assessment and was a member of the technical review group responsible for revising and updating the CIEEM Guidelines for Ecological Impact Assessment in the UK (published in 2018)

8.2 Scope, Consultation and Engagement

Scoping Responses

- 8.2.1 A Scoping Report was submitted to Stirling Council in July 2024 to establish the scope of the EIA, including methodology and approach to the Ecological Impact Assessment (EcIA). The Scoping Report records the findings of the scoping exercise and details the technical guidance, standards, best practice and criteria being applied in the assessment, to identify and evaluate the likely significant effects of the Proposed Development on ecology. Scoping responses containing comments related to non-avian ecology and nature conservation were received from the following organisations:
- Stirling Council;
 - NatureScot;
 - SEPA;
 - The Scottish Wildlife Trust (SWT); and
 - Forth District Salmon Fishery Board (DSFB)
- 8.2.2 Consultation to inform this chapter, including a summary of comments raised in the formal Scoping Opinion, and other pre-application engagement, is summarised in



Table 8-2 and Table 8-3, alongside a summary of how the assessment has responded to this feedback



Table 8-2: Consultation Summary Table

Consultee	Issue Raised	Response/Action Taken
Stirling Council	The relevant [to ecology] Stirling Local Development Plan (Adopted 2018) provisions are: Primary Policy 8: Conservation and Enhancement of Biodiversity Primary Policy 12: Renewable Energy Primary Policy 13: The Water Environment Policy 4.2: Protection of carbon-rich soils Policy 7.2: Development within and out with Conservation Areas Policy 8.1: Biodiversity Duty Policy 8.2: Proposals affecting LNCS	Referenced policies influenced design and embedded mitigation measures within the design process. Measures detailing conservation and enhancement to biodiversity are provided in Technical Appendix 8.6: Outline HMP. It is noted that Policy 7.2 relates to Cultural Heritage and is therefore not relevant to this chapter.
	NatureScot's 'Pre-application guidance for onshore windfarms', provides guidance on the issues that developers and their consultants should consider for windfarm developments. This includes information on recommended survey methods, sources of further information and guidance, and on data presentation. The EIA should include consideration of the likely impacts on designated sites in the area and should include suggestions for mitigation to address significant impacts on Special Areas of Conservation, Special Protection Areas, Ramsar sites, and Sites of Special Scientific Interest.	NatureScot pre-application guidance was followed. Survey methods adopted are detailed in Technical Appendices 8.2-8.5 and summarised in Section 8.3. Sources of existing information, including information relating to designated sites (non-statutory and statutory) are detailed in Technical Appendix 8.1: Desk Study. Impacts on designated sites are assessed in Section 8.7 and in Chapter 9: Ornithology. Assessment of effects on European sites is also provided in the separate Shadow HRA Report.
	The Site includes watercourses that are within the catchment of the Endrick Water SAC, designated for Atlantic salmon, brook lamprey and river lamprey. NatureScot consider that there is connectivity between the development proposal and the SAC. The site's status means that the requirements of the Conservation (Natural Habitats, &c.) Regulations 1994 as amended, (the "Habitats Regulations") apply.	A Shadow HRA Report considering potential effects on the Endrick Water SAC is provided separately.



Consultee	Issue Raised	Response/Action Taken
	Potential impacts can be addressed by good wind farm design, including embedded mitigation; by commitment to the employment of good construction and pollution prevention methods; the preparation and implementation of a Construction Environmental Management Plan (CEMP) or similar; and by having an Ecological Clerk of Works (ECoW) on site at appropriate stages of the development. Reference should be made to NatureScot guidance 'Good practice during windfarm construction', which is available on their website.	Embedded mitigation measures are outlined in Section 8.5, with further details included in Technical Appendix 3.1: Outline Construction and Environmental Management Plan (CEMP) .
	A number of protected species may be present on or close to the Site and could be impacted upon by the development proposal. Full details of survey methodologies, areas surveyed and details of any limitations to survey efforts should be included. This should also report the survey results including figures showing the survey areas/results with infrastructure/turbine layout overlapping, evaluate impacts predicted to arise as a result of the development proposals, assess the significance of these impacts and recommend mitigation and/or compensation measures as is necessary and appropriate.	Protected species survey methodologies and results are provided in Technical Appendices 8.3-8.4 . Impacts on protected species are assessed in Section 8.7.
	The scoping report states that NVC and UKHab surveys have been carried out. NatureScot cannot ascertain whether the proposal is located on areas of priority peatland from the 'Carbon and Peatland 2016' mapping layer, however there is unlikely to be priority peatland within the proposed Site location. They are content with the additional peat probing which will be undertaken and used to inform the final Site layout, a peatland management plan and a peat landslide hazard risk assessment.	Measures have been taken to avoid the area of shallow peat on the top Cairnoch Hill, and measures to provide biodiversity enhancement, including peatland restoration, are detailed in Technical Appendix 8.6: Outline HMP , and summarised in Section 8.7.
	The scoping report makes note of the policies of NPF4 relevant to this proposal and the intention to create a habitat management plan (HMP). For national or major developments, or those subject to Environmental Impact Assessment (EIA), Policy 3b of NPF4 states that these proposals will only be supported where it can be demonstrated that they will conserve, restore and enhance biodiversity, including nature networks, so that they are in a demonstrably better state than without intervention. The policy requires that such proposals demonstrate significant biodiversity enhancement, in addition to any proposed mitigation. Clear and specific commitments to any biodiversity offsetting and enhancement should be provided at the application stage. This would ideally include mapping to illustrate the location and minimum extents of any restoration or enhancement work.	An Outline HMP is provided in Technical Appendix 8.6 . This details measures to provide a demonstrable increase in biodiversity value within the Site.
NatureScot	Refer to 'pre-application guidance for onshore wind farms'.	NatureScot pre-application guidance was followed.



Consultee	Issue Raised	Response/Action Taken
	The EIA should include consideration of the likely impacts on designated sites with which the Proposed Development is in connectivity and the environmental statement should include suggestions for any mitigation required to address significant impacts on SACs, SPAs, Ramsar sites and SSSIs.	Impacts on designated sites (sites designated for habitats or non-avian species) are assessed in Section 8.7. Assessment of effects on European Sites is also provided in the separate Shadow HRA Report.
	The Site includes watercourses that are within the catchment of the Endrick Water SAC, designated for Atlantic salmon, brook lamprey and river lamprey. We consider that there is connectivity between the development proposal and the SAC. The site's status means that the requirements of the Conservation (Natural Habitats, &c.) Regulations 1994 as amended, (the "Habitats Regulations") apply.	Impacts on Endrick Water SAC are assessed in Section 8.7. A Shadow HRA Report considering potential effects on the Endrick Water SAC is also provided separately.
	We advise consideration is given to the potential effects of construction, operation and decommissioning of the Proposed Development in relation to the qualifying features of the SAC. The qualifying interests are sensitive to disturbance to the river habitat, including silt and sediment entering the watercourse and smothering gravel beds, suspended solids in the water column, pollution events, and changes in water quality and in water chemistry. Further information on this is given in the SNH publication ' <i>Guidance for Competent Authorities when dealing with proposals affecting SAC freshwater sites</i> '.	Impacts on Endrick Water SAC are assessed in Section 8.7. A Shadow HRA Report considering potential effects on the Endrick Water SAC is also provided in the separate Shadow HRA Report.
	Reference should be made to our guidance 'Good practice during windfarm construction', available on our website.	This guidance has been considered in the development of embedded mitigation measures (see Section 8.5).
	We advise that, unless otherwise stated, species surveys should be completed no more than 18 months prior to submission of the application, to ensure that the survey results are a contemporary reflection of species activity at and around the Site.	All surveys (non-avian) have been conducted in accordance with CIEEM guidance and are considered to be valid at the time of submission.



Consultee	Issue Raised	Response/Action Taken
	If peatland vegetation or areas of remnant peatland habitat are identified on this Site, then further consideration should be given to the underlying depth of peat on the Site. Any secondary effects on vegetation interests should be considered, assessed and any mitigation proposals presented in the ES. This includes any changes to land management practice resulting from the presence of a wind farm. It is helpful if the maps that present vegetation recorded on-site are also marked with the finalised layout of the windfarm proposal, including turbines and tracks.	Details of peatland habitats and associated NVC communities are provided in Technical Appendix 8.2: UKHab and NVC Report, and a summary is provided in Section 8.4. A peatland condition assessment is provided in Technical Appendix 10.5: Peatland Condition Assessment. All figures included in the relevant technical appendices include the Proposed Development layout.
SEPA	To avoid delay and potential objection the EIA submission must contain a series of scale drawings of sensitivities, for example peat depth, peat condition, Groundwater Dependent Terrestrial Ecosystems (GWDTE), proximity to watercourses, overlain with Proposed Development.	Potential GWDTE are shown in Figure 8.2.3 in Technical Appendix 8.2: UKHab and NVC Report. All other aspects, including an assessment of effects on GWDTE, are covered in Chapter 10: Hydrology, Hydrogeology, Geology and Soils and its associated figures and technical appendices.
	We also note that an NVC survey has been undertaken and will inform the assessment of GWDTE. We can confirm that habitat survey information is not required for areas which are heavily forested or recently felled.	N/A
	Please note that due to discrepancies in habitat definition and ambiguity in correspondence with NVC types we do not accept the use of The UK Habitat Classification System (UKHab) as an alternative to NVC.	NVC and UKHab surveys have both been conducted, refer to Technical Appendix 8.2: UKHab and NVC Report.
SWT	For national or major developments, or those subject to Environmental Impact Assessment (EIA), Policy 3b notes that these proposals will only be supported where it can be demonstrated that they will conserve, restore and enhance biodiversity, including nature networks, so they are in a demonstrably better state than without intervention. The policy requires that such proposals demonstrate significant biodiversity enhancement, in addition to	An Outline HMP is provided in Technical Appendix 8.6. This details measures to provide a demonstrable increase in biodiversity value within the Site.



Consultee	Issue Raised	Response/Action Taken
	any proposed mitigation. Only when actions result in biodiversity being left in a better state than before development are positive effects secured. SWT can offer any additional suggestions for options to achieve these as recommended by the policy guidance.	SWT were contacted for their biodiversity enhancement suggestions.
	SWT highlighted planting guidance: Annex 2 [of the SWT response] gives a list of invasive species that developers should not plant as part of any mitigation. Annex 3 [of the SWT response] is an approach to help developers and planners to document that mitigation achieves no net loss for biodiversity and that positive effects result – a recommended exercise.	Any planting will adhere to restrictions outlined in Annex 2 of the SWT response. Details on restoration and enhancement of biodiversity within the Site is provided in the Outline HMP in Technical Appendix 8.6.
	Factors requiring careful investigation: Designated areas especially Carron Valley Local Nature Conservation Site (LNCS) covering the reservoir extent; River Catchments: Leven, Carron and Endrick; Peat; Important plants such as Schleicher's thread moss known to occur in the area; Known protected species include red squirrel, pine marten, brown hare, sea trout, otter and Odonata; Consideration of cumulative impacts (including access tracks)	Designated sites, statutory and non-statutory, were identified in the Desk Study, Technical Appendix 8.1 . Impacts on designated sites (sites designated for habitats or non-avian species) are assessed in Section 8.7. Assessment of effects on European sites is also provided in the separate Shadow HRA Report. Effects on aquatic features and their habitat are assessed where relevant within this chapter. Effects on water quality, watercourse crossing schedules, peat condition and ground water are assessed in Chapter 10: Hydrology, Hydrogeology, Geology and Soils . Schleicher's thread moss <i>Bryum schleicheri</i> , or suitable habitat to support the species was not



Consultee	Issue Raised	Response/Action Taken
		identified with the study area, refer to Technical Appendix 8.2 . Protected species surveys, including electrofishing, were conducted across the Site, refer to Technical Appendices 8.3-8.5 . A full assessment on potential impacts is provided in Section 8.7. An assessment of cumulative effects is provided in Section 8.7.
Forth DSFB	The documentation mentioned electrofishing surveys of the minor watercourses which are part of the Carron/Forth catchment, and The Board felt these surveys were adequate in determining what fish species are present within the project area.	Electrofishing was conducted across watercourses within the Site and wider study area considered to have habitat suitability of moderate or higher, refer to Technical Appendix 8.5: Fish Habitat Survey Report.
	The Board would like to be assured that the electrofishing surveys are informative, performed by a licenced operator, and is representative of the habitat which may be impacted by the works.	Electrofishing surveys were conducted by three experienced SFCC qualified licence holders; one team lead and two to Level II. Further details are provided in Technical Appendix 8.5: Fish Habitat Survey Report .



Additional Pre-application Engagement

8.2.3 Outside of the formal scoping process, further consultation was undertaken with NatureScot, Carron Valley Fishery and Loch Lomond Fisheries Trust, details of which are summarised in **Table 8-3**.

Table 8-3: Additional Consultation

Consultee	Date	Enquiry Topic	Response
NatureScot	30/09/2024	Whether freshwater pearl mussel should be considered within the Endrick Water or tributaries within the application boundary.	'It is NatureScot's position that scoping out freshwater pearl mussel from further assessment within the EIA would be acceptable'. No further action required.
Carron Valley Fishery	30/10/2024	Whether rod catch data is available to inform likely species presence within the Carron Valley Reservoir.	No data are available for share / no further action required.
Loch Lomond Fisheries Trust	08/11/2024 20/11/2024	Whether any electrofishing data is available for the Endrick Water.	No response / no further action required.

8.3 Assessment Approach and Methods

Scope of Assessment

- 8.3.1 The scope of this assessment was defined through a review of existing ecological data, targeted field surveys and consideration of consultee responses to the Scoping Report for the Proposed Development.
- 8.3.2 Details relating to ecological features that have been subject to a full assessment of likely effects as a result of construction and operation of the Proposed Development, and those that have been scoped out, are provided in Section 8.6.

Study Area

- 8.3.3 The 'study area' incorporates the area over which desk and field-based data were gathered to inform this assessment. The study area may differ according to each ecological feature concerned, based on good practice guidance and the proposed search areas set out within the Scoping Report. Specific study areas referred to in the assessment include:
- The 'Site' – the area within the application boundary, within which the Proposed Development lies;
 - Desk study search area (10km search radius from the Site boundary for sites of European and National importance and a 2km radius for non-statutory designated sites and legally protected and notable species, which was extended to a 10km search radius for bat records);
 - The study area used for habitats and vegetation surveys is shown on **Figure 8.2.1a-y** and **Figure 8.2.2ai** within **Technical Appendix 8.2** and includes all areas within the Site and an associated buffer zone that ensures coverage of wetland habitats within 250m of all proposed wind turbines and borrow pits, and 100m from all other



proposed infrastructure, including the access route from the B818. SEPA guidelines (SEPA, 2024) stipulate survey of a 250m buffer from excavations deeper than 1m, and a 100m buffer for excavations of less than 1m; and

- The study areas for relevant faunal species are summarised in the 'Field Survey Methodology' Section below and are described in more detail within **Technical Appendices 8.2-8.5**. For ease of reference the study areas included all suitable habitat within the Site, as well as watercourses within 250m of proposed infrastructure (where these lie outside of the Site boundary) for mammals and the Fish Habitat Assessment, and within the Site and a 200m plus rotor radius from proposed turbines (where this lies outside the Site) for bats.

8.3.4 The design of the Proposed Development has undergone multiple iterations (including amendments to the extent of the Site boundary, as discussed in **Chapter 2: Design Evolution and Alternatives**, therefore the study area has been adjusted throughout the design phase to enable an adequate amount of data to be gathered, in order to inform the assessment of likely significant effects on ecological features.

Information and Data Sources

8.3.5 An ecological desk study was undertaken to collate available ecological information in relation to the Site and surrounding environment (see **Technical Appendix 8.1: Desk Study**).

8.3.6 The desk-based study sought to gather information relating to a range of ecological features with the relevant study areas, including: statutory and non-statutory designated sites; legally protected or notable non-avian faunal species; and habitats and botanical species of conservation importance. **Table 8-4** sets out key sources of desk study information and the associated spatial coverage searched.

8.3.7 Desk study data relating to protected and notable species were acquired from the following sources:

- The Wildlife Information Centre (TWIC) was commissioned in June 2022 to provide data relating to records of protected and notable species within the Site and a 10km buffer for all bat species, and a 2km radius for all other protected/notable species (limited to records within the last 15 years);
- NatureScot's Carbon and Peatland 2016 Map was reviewed, which gives a value to indicate the likely presence of carbon rich soils, deep peat and priority peatland habitat for the Site, at a coarse scale across Scotland;
- Ancient Woodland Inventory (AWI) Scotland : A search was made for woodlands listed on the AWI within a 10km radius of the Site; and
- A search of the Stirling Planning Portal for relevant reports submitted as part of the application for other nearby developments within 10km of the Site was made, and where relevant information could be obtained, these reports were reviewed for relevant ecological information.

Table 8-4: Desk Study Information Sources

Ecological Feature	Description	Spatial Coverage	Data Source
Statutory designated nature conservation sites	Sites of European Importance: • Special Areas of Conservation (SACs); and	The Site and surrounding 10km radius	NatureScot Sitelink online mapping



Ecological Feature	Description	Spatial Coverage	Data Source
	- Wetlands of International Importance (Ramsar sites) Sites of National Importance: - Sites of Special Scientific Interest (SSSIs); and - National Nature Reserves (NNRs). Sites of Local Importance: - Local Nature Reserves (LNRs)		tool ⁷ ; and the Multi Agency Geographic Information for the Countryside (MAGIC) web-based mapping tool ⁸ .
Non-statutory designated nature conservation sites	Local Nature Conservation Sites (LNCS)	The Site and surrounding 2km radius	TWIC; NBN Atlas (CC_BY only) ⁹ ; Saving Scotland's Red Squirrels ¹⁰ ; NatureScot website ¹¹ .
Legally protected species	Legally protected non-avian species, including those listed within: - The Habitats Regulations (Schedules II and IV); - Wildlife and Countryside Act 1981 (as amended in Scotland) (Schedules 5 and 8); and - Protection of Badgers Act 1992.		
Notable species	- Species listed on the SBL as species of principal importance for biodiversity conservation; - Species listed within the Stirling Council Biodiversity Action Plan; or - Species classified as nationally rare or scarce.		
Legally controlled species	Invasive non-native species (INNS) listed on Schedule 9 of the Wildlife and Countryside Act (1981) (as amended in Scotland).		
Habitats and other features of interest	Watercourses and waterbodies, woodland, heath and mire habitat. Habitats within the SBL and therefore of principal importance for biodiversity conservation in Scotland.	Site itself (plus 2 km radius for ancient woodland)	NatureScot's Carbon and Peatland Map 2016 ¹² ; Google Maps ¹³ and Google

⁷ The NatureScot Sitelink website [online]. Available at: <https://sitelink.nature.scot/map>

⁸ The Multi Agency Geographic Information for the Countryside (MAGIC) web-based mapping tool is available online at <https://magic.defra.gov.uk/>

⁹ NBN Atlas. (2024). Explore Your Area. [online] Available at: Explore Your Area | NBN Atlas [Accessed 7 November 2024].

¹⁰ Saving Scotland's Red Squirrels. (2024). Sightings. [online] Available at: Saving Scotland's Red Squirrels – Transforming hope for Scotland's red squirrels [Accessed 7 November 2024].

¹¹ NatureScot. (2023). Protected species: fish. [online] Available at: Protected species: fish | NatureScot [Accessed 7 November 2024].

¹² NatureScot. (2016). Carbon and Peatland 2016 Map. [Online] Available at: https://map.environment.gov.scot/Soil_maps/?layer=10

¹³ Google maps available online at: <https://www.google.co.uk/maps> [Accessed in May 2024]



Ecological Feature	Description	Spatial Coverage	Data Source
			Earth ¹⁴ Websites; AWI (Scotland) ¹⁵

Field Surveys

- 8.3.8 A suite of baseline ecological surveys were initially carried out during 2022 to inform the EIA for the Proposed Development. Due to the time that has since elapsed, and following amendments to the Site, additional fieldwork was carried out in 2024. Further details of surveys completed are provided in **Technical Appendices 8.2-8.5** with a summary also provided below.

Vegetation Surveys

UK Habitat Classification Survey

- 8.3.9 A UKHab Classification survey was undertaken from 20 to 23 May 2024 (refer to Technical Appendix 8.2). The survey followed methods described in the UKHab user manual. The survey aimed to identify habitats of conservation concern, protected or notable plant species and INNS. Target notes were taken to describe any notable features such as flushes, bog pools and areas with habitat disturbance.
- 8.3.10 Surveys were carried out within the Site and a maximum 250m buffer.

National Vegetation Classification Survey

- 8.3.11 An NVC survey was undertaken simultaneously with the UKHab survey in May 2024 using the NVC system¹⁶ and in accordance with relevant survey guidelines¹⁷ covering the Site and a 250m survey buffer (refer to **Technical Appendix 8.2**). Habitat communities recorded during the survey were assessed against Scotland and Northern Ireland Forum for Environmental Research (SNIFFER)¹⁸ and SEPA⁶ guidelines for identifying potential GWDTEs.
- 8.3.12 A more detailed assessment of the likely groundwater dependence of these communities was then undertaken as part of the hydrogeology assessment (**Chapter 10: Hydrology, Hydrogeology, Geology and Soils**).

Protected Species Surveys

Mammals

- 8.3.13 Walkover surveys for protected and notable species (focused on otter (*Lutra lutra*), water vole (*Arvicola amphibius*), red squirrel (*Sciurus vulgaris*), badger (*Meles meles*) and pine marten (*Martes martes*) were undertaken in 2022 and 2024. Refer to **Technical Appendix 8.3** for exact survey dates. The species specifically targeted were based on the likelihood

¹⁴ Google Earth available online at: <https://earth.google.com/web/> [Accessed in May 2024]

¹⁵ NatureScot (n.d.). Ancient Woodland Inventory. [online] opendata.nature.scot. Available at: <https://opendata.nature.scot/datasets/ancient-woodland-inventory/explore> [Accessed 1 July. 2024].

¹⁶ Rodwell, J. S. (Editor) (1991 et seq). British Plant Communities, 1, Cambridge University Press: Cambridge.

¹⁷ Rodwell, J. S. (2006). NVC User's Handbook, 1, JNCC: Peterborough.

¹⁸ SNIFFER. (2009). WFD95: A Functional Wetland Typology for Scotland. [Online] Available at: <https://www.sniffer.org.uk/Handlers/Download.ashx?IDMF=a6579282-8428-4282-bfc7-17c7e6027601> [Accessed October 2024].



of occurrence of each species, ascertained from known species distribution and habitat suitability.

- 8.3.14 Surveys followed standard methodologies in place at the time of survey for otter^{19,20,21}, water vole²², red squirrel²³ and badger^{24,25}
- 8.3.15 Surveys were carried out within all suitable habitat on Site and within 100m for water vole, red squirrel and badger, and 200m for pine marten and otter in line with relevant guidance. The survey areas are shown in **Figure 8.3.1** and **Confidential Figure 8.3.2** in **Technical Appendix 8.3**.

Bats

- 8.3.16 A daytime bat walkover (“DBW”) was undertaken in May 2024 to categorise surrounding habitat suitable to support roosting, foraging and commuting bats in order to assign a ‘level’ of commuting and foraging suitability (i.e. High, Moderate, or Low) (See **Technical Appendix 8.4: Bat Survey**). The survey covered the Site plus a 50m buffer (where accessible), hereafter referred to as the ‘survey area’.
- 8.3.17 A ground level tree assessment (GLTA) was undertaken in May 2024 to inspect three trees identified by the DBW for potential roosting features (PRFs) and evidence of bats such as droppings and/or urine staining. The suitability of trees to support bats was characterised under the Bat Conservation Trust (BCT) guidelines (i.e. NONE, Further Assessment Required (FAR) and Potential Roost Feature (“PRF I/M”) (see **Technical Appendix 8.4: Bat Survey** for further details).
- 8.3.18 Based on the four wind turbine layout proposed at the time of survey in 2024, a programme of automated bat activity surveys using full spectrum static bat detector units (Wildlife Acoustics SM4BATFS) was planned and carried out at all proposed wind turbine locations, in accordance with relevant guidance²⁶, plus four additional locations situated between the proposed wind turbines, during the 2024 active bat season to cover a range of habitats present within the Site. A total of eight static detectors were therefore deployed (see **Figure 8.4.2** in **Technical Appendix 8.4** for detector locations).
- 8.3.19 Each static detector unit was set to record bat activity for a minimum period of ten consecutive nights per season (Spring – May/ June; Summer – July; Autumn – August/September), with each night of monitoring commencing approximately 30 minutes before sunset and ending 30 minutes after sunrise. Further information, including details of sonogram analysis, are contained within **Technical Appendix 8.4: Bat Survey**.
- 8.3.20 During the design process, proposed wind turbine locations were moved within the Site in 2025. To account for potential gaps in coverage of static detector units within the Site, three of the static detector data sets from previous surveys in 2022 were analysed to check that the 2024 survey data were representative of other areas within the Site. Bat activity monitoring was initially undertaken in 2022, however, data were not analysed as

¹⁹ Chanin, P. (2003). Ecology of the European Otter. Conserving Natura 2000 Rivers, Ecology Series No. 10. English Nature: Peterborough

²⁰ Bang, P. & Dahlstrøm, P. (2001). Animal Tracks and Signs. Oxford University Press: Oxford.

²¹ Sargent, G. & Morris, P. (2003) How to find & Identify Mammals. The Mammal Society: London.

²² Strachan, R. (2006). *Water Vole Conservation Handbook*. 2nd Edition.

²³ Gurnell, J., Lurz, P. & Pepper, H. (2001). Practical Techniques for Surveying and Monitoring Squirrels.

²⁴ Neal, E. & Cheeseman, C. (1996). *Badgers*. Poyser Natural History, London.

²⁵ Reynolds, P. & Harris, M. (2005). Inverness Badger Survey 2003. Scottish Natural Heritage Commissioned Report No. 096

²⁶ NatureScot. (2021). Bats and onshore wind turbines – survey, assessment and mitigation. [Online] Available at: <https://www.nature.scot/doc/bats-and-onshore-wind-turbines-survey-assessment-and-mitigation#:~:text=3.-ASSESSING%20POTENTIAL%20IMPACTS,other%20forms%20of%20anthropogenic%20mortality>



the survey data were superseded by data collected in 2024. The location of static detector units from 2022 is shown in **Figure 8.4.2** in **Technical Appendix 8.4**.

- 8.3.21 Bat echolocation calls recorded during activity surveys were analysed in full spectrum format using Kaleidoscope Pro software. While the software is efficient, it is not totally infallible. Manual classification of echolocation files was therefore also carried out for all files (100%) recorded as bat species through the auto-ID system; all files recorded as 'no-ID' through the auto-ID system; and spot checks and amendments, where required, of at least 25% of total noise files recorded through the auto-ID system.

Aquatic Ecology

- 8.3.22 A fish habitat assessment was undertaken in May 2024 to assess the potential for fish species of conservation concern (e.g. salmonids, lamprey sp. and European eel (*Anguilla anguilla*) to be present in watercourses within the study area. The study area included watercourses within and 250m from proposed infrastructure. The survey was based on an adapted version of the methodologies developed by Hendry and Cragg-Hine²⁷ and the Scottish Fisheries Co-ordination Centre (SFCC) Habitat Survey Methodology²⁸ and also considered the potential for the study area to support freshwater pearl mussel (FWPM) (*Margaritifera margaritifera*). Full details can be found in **Technical Appendix 8.5: Fish Habitat Survey**.
- 8.3.23 Electrofishing was conducted in August 2024 by three experienced SFCC qualified persons using an EF-500B-SYS Electric Fishing Backpack System and single anode at 350 volts. Fully quantitative electrofishing surveys were conducted at a total of seven survey locations determined by the fish habitat assessment; those locations considered to have 'moderate' or higher potential to support fish were subject to electrofishing surveys. No fish were identified during any of the electrofishing surveys, as such analysis of electrofishing data was not required.

Herptiles

- 8.3.24 Walkover surveys for protected species were conducted over the course of the summer 2024, this included Habitat Suitability Index (HSI) assessments for great crested newt (GCN) (*Triturus cristatus*) within any ponds identified. The study area encompassed the Site and 250m buffer (maximum). Two ponds were identified as having potential for GCN (HSI scores of 0.82 and 0.68 with a suitability of excellent and average respectively) and were subject to additional surveys via environmental DNA (eDNA) survey in May 2024 (see **Technical Appendix 8.3** for further details).
- 8.3.25 Other amphibians do not require further surveys to inform an EIA for onshore windfarms with standard mitigation, these species are unlikely to experience significant environmental effects, however, incidental sightings were recorded²⁹. Reptiles were not surveyed due to the large size of the Site and because presence of common lizard (*Zootoca vivipara*) had already been confirmed via incidental sightings in 2022. Any further incidental sightings were recorded as seen.

²⁷ Hendry, K. & Cragg-Hine, D. (2003). Ecology of the Atlantic Salmon. Conserving Natura 2000 Rivers Ecology Series No 7. English Nature: Peterborough.

²⁸ Scottish Fisheries Co-ordination Centre. (2010). Habitat Surveys Training Course Manual. pp. 1-64. [Online] Available at: <https://fms.scot/wp-content/uploads/2019/03/SFCC-Training-Manual.pdf>.

²⁹ NatureScot. (2024). NatureScot pre-application guidance for onshore wind farms. [Online] Available at: <https://www.nature.scot/doc/naturescot-pre-application-guidance-onshore-wind-farms>



Incidental sightings

- 8.3.26 During all ecological surveys, incidental sightings of other notable fauna were also recorded.

Survey Limitations and Data Confidence

- 8.3.27 Presented here is a summary of limitations detected during the surveys, further details are presented in **Technical Appendices 8.1-8.5**. It should be noted that none of these limitations are considered likely to significantly affect the assessment.
- 8.3.28 An ecological survey provides only a “snapshot” of the conditions prevailing at the time of survey. Whilst it is considered unlikely that any significant evidence of protected or otherwise notable mammal species was overlooked during survey work, due to the nature of the subjects of ecological surveys it is feasible that species that use the survey area may not have been recorded by virtue of their seasonality, cryptic behaviour, habit or random chance. It is considered unlikely however, that additional surveys of the area would materially alter the conclusions of the baseline survey work. Pre-construction surveys for protected species are proposed (see Section 8.5), which are intended to address any issues resulting from future changes in the distribution of protected species and provide detailed baseline data which can be used to inform the requirement for mitigation actions and support any future licence applications.

Habitat Surveys

- 8.3.29 The UKHab Minimum Mapping Unit (“MMU”) for the field survey was 400m², which may result in small areas of notable habitat being excluded from the habitat maps. In order to ensure all areas of notable habitat were effectively captured, point features and target notes detailing the location of each habitat, key species, and general condition were recorded during the field survey.

Protected Species Surveys

- 8.3.30 Areas of dense conifer plantation could not be readily accessed and as a result surveys focused on edge habitat and forestry rides meaning there is potential to have missed/under recorded field signs. As dense conifer plantations are generally not considered to be suitable habitat for protected species, with surveys focusing on preferred habitat types as per the relevant methodologies, this is not considered to be a significant limitation.
- 8.3.31 Mammal surveys were conducted during summer 2024, as such marginal and vascular vegetation was at maximum height and may have obscured some protected species signs. Given that evidence was identified for numerous species this is believed to contribute minimal limitations to the conclusions made in this assessment.
- 8.3.32 Scheduling of surveys avoided dates after prolonged rainfall (optimally targeting periods of 3-5 days of dry weather prior to survey), however, due to an extremely wet summer this was not always possible. Minimal evidence of otter spraints was identified on watercourses despite historical evidence of use and may represent an underestimation of actual baseline conditions. Given the widespread occurrence of otter in Scotland, and historic evidence of use, it is assumed that otter will use all suitable watercourses within the Site boundary and 200m buffer.

Bat Surveys

- 8.3.33 Due to an equipment malfunction, no data was collected at Static A during the spring survey period, nor at Statics C and H during the autumn survey period. Malfunctions are



relatively common when using static detectors at such sites and despite the limitation is data coverage it is considered that data collected from the remaining statics during these time periods provide sufficient coverage and a suitable representation of bat activity within the survey area, especially given the use of eight detectors (twice as many as the minimum required by NatureScot *et al.* (2021) guidance.

- 8.3.34 Bat statics were deployed in 2024 using what was at the time the most recent wind turbine layout, this was subject to revisions in 2025, thus spatial coverage is limited for Turbine 1 and 2. Bat statics were deployed in previous iterations of the Proposed Development in 2022 across the entire Site. Three bat static data sets from 2022 were selected, due to their close proximity to Turbine 1 and 2 to provide additional information from which to determine whether the 2024 data are representative of all proposed wind turbine locations. Data from the selected 2022 locations indicated similar species assemblages and activity levels to 2024 data (see **Technical Appendix 8.4: Bat Survey**), and as such the positioning of the static bat detectors in 2024 is not considered a significant limitation to this assessment.

Aquatic Surveys

- 8.3.35 Fish habitat assessments were conducted in May 2024 during low flow conditions, this was a limiting parameter at all survey locations, as such no watercourse was categorised as 'optimal'. May 2024 was not unseasonably dry and as such is considered reflective of actual conditions, and this does not therefore provide a significant limitation to this assessment.
- 8.3.36 Electrofishing surveys were conducted in August 2024 after a period of significant rainfall and determined no fish to be present in the watercourses assessed despite suitable habitat. Heavy rainfall events have the potential to wash fish downstream, and as such preceding weather events may have led to an underestimation of fish species and populations, this is considered to be a major survey limitation. In lieu of this, it is assumed for the purposes of this assessment that brown trout (*Salmo trutta*) are likely to be present within the lower reaches of watercourses, where accessible from the Carron Valley Reservoir.

Assessment Methods

- 8.3.37 The CIEEM Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2024) (henceforth referred to as the "CIEEM guidelines") form the basis of the impact assessment presented in this chapter. The CIEEM guidelines have been endorsed by NatureScot. It is noted that some aspects of the CIEEM approach to impact assessment differ from the general impact assessment methodology used within other chapters. The methodology followed in this chapter is set out below.

Importance of Ecological Features

- 8.3.38 In accordance with the CIEEM guidelines, only ecological features (habitats, species, ecosystems and their functions/ processes) which are considered to be important and may be affected by the Proposed Development have been subject to detailed assessment. Ecological features can be important for a variety of reasons and the rationale used to identify them is explained here. Importance may relate, for example, to the quality or extent of the habitats within the Site; habitat and/or species rarity; the extent to which such habitats and/or species are threatened throughout their range, or to the habitats' and/or species' rate of decline. It is not necessary to carry out detailed assessment of features that are sufficiently widespread, unthreatened and resilient to impacts from the Proposed Development and will remain viable and sustainable.



- 8.3.39 The importance of identified ecological features has been assessed to place their relative nature conservation value within a defined geographical context. For this assessment the following geographic frame of reference has been used:
- International;
 - National (i.e. Scotland);
 - Regional (i.e. Central Scotland);
 - County (i.e. Stirlingshire);
 - Local (i.e. within circa (c.) 10km); and
 - Less than local.
- 8.3.40 For designated sites, their importance reflects the geographical context of the designation. For example, a Site of Special Scientific Interest (SSSI) would normally be considered nationally important and an SAC internationally important.
- 8.3.41 The value of habitats has been measured against published selection criteria and other relevant data where available. Examples of relevant criteria include Annex 1 of the Habitats Directive, the SBL and the Stirling Council Local Biodiversity Action Plan.
- 8.3.42 In assigning a level of value to a species, it is necessary to consider its distribution and status, including a consideration of trends based on available historical records. Reference has therefore been made to published lists and criteria where available. Examples of relevant lists and criteria include: species of European conservation importance (as listed on Schedule II and IV of the Habitats Regulations), species listed within the SBL and therefore considered to be of principal importance for biodiversity conservation in Scotland, and priority species listed within the Stirling Council Local Biodiversity Action Plan.
- 8.3.43 In accordance with CIEEM guidelines, detailed assessment is only required for Important Ecological Features (IEFs). For the purposes of this assessment, only ecological features of local importance or greater and/or subject to legal protection that are potentially subject to effects resulting from the Proposed Development have been subject to detailed assessment. Effects on other ecological features are considered unlikely to be significant in legal or policy terms and have therefore been scoped out of the assessment process.

Assessing Impacts and the Significance of Effects

- 8.3.44 The ecological impact assessment process involves the following steps:
- Identifying and characterising impacts³⁰;
 - Incorporating measures to avoid and mitigate (reduce) these impacts (embedded and standard mitigation methods);
 - Assessing the significance of effects, assuming that all embedded design and applied mitigation measures are implemented;
 - Identifying appropriate mitigation measures to reduce likely significant effects (if required and where possible);

³⁰ In accordance with the CIEEM guidelines, for the purposes of this assessment impact is defined as 'actions resulting in changes to an ecological feature'. For example, the loss of a section of watercourse due to construction of a watercourse crossing. Effect is defined as an 'outcome to an ecological feature from an impact'. For example, the effects on an otter population from loss of a section of watercourse.



- Assessing the significance of likely significant residual effects, following the implementation of additional mitigation measures (where appropriate);
- Identifying appropriate compensation measures to offset likely significant residual effects (if required); and
- Identifying opportunities for ecological enhancement.

8.3.45 When characterising ecological impacts, reference has been made to the following characteristics, as appropriate:

- i) **Adverse or beneficial** (i.e. whether the impact has a beneficial or adverse effect in terms of nature conservation objectives and policy);
- ii) **Direct or indirect** (direct impacts are changes that are directly attributable to a defined action, e.g. the physical loss of habitat during the construction process. Indirect ecological impacts are attributable to an action, but which affect ecological resources through effects on an intermediary ecosystem, process or feature, e.g. the creation of tracks which cause hydrological changes, which could lead to the drying out of wetland habitats);
- iii) **Magnitude** (quantified wherever possible, e.g. area of habitat lost, number of potential roost features affected, etc);
- iv) **Duration** (specifically whether impacts would be permanent or temporary, and if temporary over what period);
- v) **Frequency and timing** (how frequently ecological features may be affected and at what times of year, times of day, etc); and
- vi) **Reversibility** (i.e. whether impacts may be reversible and over what timescales, e.g. re-establishment of habitats following temporary loss or disturbance).

8.3.46 The concept of ecological significance is addressed in the CIEEM guidelines. Significance is a concept related to the weight that should be attached to effects when decisions are made. For the purpose of ecological impact assessment, a 'significant effect' is an effect that either supports or undermines biodiversity conservation objectives for 'important ecological features' or for biodiversity in general. Conservation objectives may be specific (e.g. for a designated site) or broad (e.g. national/local nature conservation policy) or more wide-ranging (enhancement of biodiversity). Effects can be considered significant at a wide range of scales from international to local and the scale of significance of an effect may or may not be the same as the geographic context in which the feature is considered important.

8.3.47 Paragraphs 5.29 – 5.34 of the CIEEM guidelines cover how significant effects are determined. To summarise:

- For designated sites – effects may be significant if they are likely to undermine the conservation objectives of the site; or beneficially or adversely affect the conservation status of species or habitats for which the site is designated; or may affect the condition of the site or its interest/qualifying features.
- For ecosystems – effects may be significant if the project is likely to result in a change in ecosystem structure and function. Consideration should be given as to whether any processes or key characteristics will be removed or changed, if there will be an effect on the nature, extent, structure and function of component habitats or if there is an effect on the average population size and viability of component species.



- For habitats and species – consideration of conservation status is important for evaluating the effects of impacts on individual habitats and species and assessing their significance. Conservation status is defined as follows:
 - Habitats – conservation status is determined by the sum of the influences acting on the habitat that may affect its extent, structure and functions, as well as its distribution and its typical species within a given geographical area.
 - Species – conservation status is determined by the sum of influences acting on the species concerned that may affect its abundance and distribution within a given geographical area.

Avoidance, Mitigation, Compensation and Enhancement

- 8.3.48 The purpose of avoidance, mitigation and compensation measures are to reduce the magnitude of project impacts. The aim of these measures is to reduce the project's adverse impacts such that there is no net loss of biodiversity as a result of the project. Within EclA, mitigation measures should be described clearly and their likely success assessed. In Scotland, there is currently no requirement within EclA to quantify losses and gains using a metric. There is, however, a need for projects to provide significant biodiversity enhancements, in addition to any proposed mitigation (NPF4 Policy 3b).
- 8.3.49 When seeking mitigation or compensation solutions, efforts should be consistent with the geographical scale at which an effect is significant. For example, mitigation and compensation for effects on a species population significant at a regional scale should ensure no net loss of the population at a regional scale. The relative geographical scale at which the effect is significant will have a bearing on the required outcome which must be achieved.
- 8.3.50 A sequential process has been adopted to avoid, mitigate and compensate for ecological impacts, as recommended in the CIEEM guidelines. This is often referred to as the 'mitigation hierarchy'. The mitigation hierarchy sets out a sequential approach beginning with the avoidance of impacts where possible, the application of mitigation measures to minimise unavoidable impacts and then compensation for any remaining impacts. Once avoidance and mitigation measures have been applied residual effects are then identified along with any necessary compensation measures, and incorporation of opportunities for enhancement.
- 8.3.51 It is important for the EIA to clearly differentiate between avoidance, mitigation, compensation and enhancement, the terms of which are defined here as follows:
- Avoidance is used where an impact has been avoided e.g. through changes in scheme design;
 - Mitigation is used to refer to measures to reduce or remedy a specific adverse impact *in situ*, for example timing restrictions during construction to avoid key periods for certain species;
 - Compensation describes measures taken to offset residual effects, i.e. where mitigation *in situ* is not possible, for example, creation of new habitats to compensate for habitats lost; and
 - Enhancement is the provision of new benefits for biodiversity that are additional to those provided as part of mitigation or compensation measures, although they can be complementary.



Cumulative Effects

- 8.3.52 Cumulative effects can result from individually insignificant but collectively significant actions taking place over a period of time or concentrated in a particular location. Cumulative effects can occur where a Proposed Development results in individually insignificant impacts that, when considered in combination with impacts of other proposed or permitted plans and projects, can result in significant effects.
- 8.3.53 For (non-avian) ecological features potential cumulative impacts are only likely to be significant for other developments which:
- Are directly adjacent or very close to the Site and may affect the same habitats and species;
 - Are located within the same hydrological sub-catchment(s) so may be affected by water-borne sedimentation or pollution events; or
 - Are located within the regular range of more mobile species, e.g., bats and otter.
- 8.3.54 Other developments considered in the cumulative assessment were therefore restricted to other development projects within 2km, or within the same hydrological sub-catchments and within 10km, that could impact upon the areas immediately downstream of the watercourses that drain the Proposed Development, or within Core Sustainance Zones (CSZ) of the most widely ranging bat species recorded at the Site (i.e. 8km, based on a 4km CSZ as a roost located 4km from the Site could also be affected by other developments located 4km in the opposite direction from the roost). The cumulative assessment is based on consideration of residual effects, assuming that proposed mitigation and compensation measures for other projects are implemented.
- 8.3.55 The cumulative effects assessment includes other projects under construction; consented projects which are not yet under construction and projects for which planning applications have been submitted. Operational wind farm projects located within the relevant CSZ for bats have also been included as part of the cumulative assessment for bats only (operational wind farms are unlikely to result in cumulative effects for other (non-avian) ecological features). Minor developments such as individual dwellings, extensions, driveways and forestry tracks are excluded from the cumulative assessment as they are considered unlikely to incur significant cumulative effects.
- 8.3.56 The significance of potential cumulative effects has been determined using the same method adopted in the assessment of effects for the Proposed Development considered on its own. Cumulative effects are therefore considered likely to be significant if they undermine conservation objectives for IEFs. Cumulative effects can be considered significant at a wide range of scales from international to local.

8.4 Baseline Conditions

Current Baseline

- 8.4.1 A summary description of ecological features identified through desk and field-based baseline studies is provided below. For further details, please refer to **Technical Appendices 8.1-8.5**.

Statutory Designated Sites

- 8.4.2 There are 15 statutory designated sites within 10km of the Site designated for their non-avian ecological features, including 12 SSSIs, two SACs, and one National Nature Reserve (NNR). These are detailed in **Table 8-5** below and their locations are shown in **Figure 8.1.1** in **Technical Appendix 8.1**.

**Table 8-5: Statutory Designated Sites**

Statutory Designated Site and Designation	Approximate distance and direction from Site (km)	Qualifying Feature(s) of Interest
Endrick Water SSSI and SAC ³¹	1.4 W	SSSI – Scottish dock (<i>Rumex aquaticus</i>), river lamprey (<i>Lampetra fluviatilis</i>), brook lamprey (<i>Lampetra planeri</i>), Atlantic salmon (<i>Salmo salar</i>) and fluvial geomorphological interest. SAC – river lamprey, brook lamprey and Atlantic salmon.
Denny Muir SSSI	3.5 ESE	Subalpine acid grassland, blanket bog and basic fen.
Double Craigs SSSI	3.5 WNW	Subalpine calcareous grassland and geological interest.
Carron Glen SSSI	3.8 E	Upland oak woodland, upland mixed ash woodland and lowland neutral grassland.
Sauchie Craig Wood SSSI	6.0 NE	Upland mixed ash woodland, also of geological interest.
Dullatur Marsh SSSI	6.8 SE	Hydromorphological mire range.
Sculliongour Limestone Quarry SSSI	7.9 SW	Lowland calcareous grassland.
Balglass Corries SSSI	8.1 W	Blanket bog, upland assemblage, also of geological interest.
Wester Balgair Meadow SSSI	8.9 WNW	Lowland dry heath, lowland wet heath, valley fen and lowland neutral grassland.
Arnprior Glen SSSI	9.6 NW	Upland mixed ash woodland.
Shirgarton Moss SSSI	9.7 NW	Raised bog.
Flanders Moss SSSI, SAC, NNR	9.7 NW	SSSI - raised bog, moth assemblage, spider (<i>Heliophanus dampfi</i>) and geological interests. SAC – active raised bog and degraded raised bog.

Non-Statutory Designated Sites

8.4.3 Five non-statutory designated sites are present within 2km of the Site. Details of these sites can be found in **Table 8-6**: below.

³¹ The Endrick Water SSSI and SAC have overlapping boundaries in the upper catchment of the Endrick Water, however, the SSSI ends approximately 4.75km upstream of Loch Lomond, whilst the SAC covers the entirety of the lower reaches including the mouth at Loch Lomond.

**Table 8-6: Non-Statutory Designated Sites**

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	0.2 SE	Scenic trout fishery and forestry.
Carron Forest LNCS	0.8 SE	Forestry.
Upper Endrick Water LNCS	1.0 W	Inland waterbodies, deciduous woodland, bog and marsh habitats.
River Carron (Bentend) and Faughlin Reservoir LNCS	1.7 ESE	Reservoir and river habitat. Atlantic salmon.

Vegetation Baseline

- 8.4.4 Habitats identified under the UKHab classification and NVC communities within the study area are shown in **Table 8-7**: with more detailed habitat descriptions and quadrat data provided in **Technical Appendix 8.2**. The mapped results are shown on **Figures 8.2.1a-y** and **Figures 8.2.2a-i** in **Technical Appendix 8.2** (with proposed infrastructure locations overlain).
- 8.4.5 The Site predominantly lies on forestry land and includes one area of peatland (the plateau on top of Cairnoch Hill). Site-specific information relating to carbon-rich soils and peat (including a peat depth survey) is contained in **Chapter 10: Hydrology, Hydrogeology, Geology and Soils**.
- 8.4.6 Two Annex 1 habitats were identified within the study area: *Carex rostrata-Sphagnum recurvum* mire; and *Carex rostrata-Calliergon cuspidatum/giganteum* mire. A total of 17 habitats listed on the SBL were identified within the study area, these are summarised in **Table 8-7**. **Table 8-7** also summarises the conservation status for each habitat/community and evaluates the importance of each habitat/community within the study area. For habitats recorded in mosaic, the mosaics have been evaluated based on their floristic composition, underlying substrate and occurrence within the study area.
- 8.4.7 One INNS, giant hogweed (*Heracleum mantegazzianum*), was identified within the survey area but not within the Site boundary.
- 8.4.8 One area of ancient woodland (ID:9871) was identified along the southeast boundary of the Site, on the margins of the Carron Valley Reservoir which is a long-established (of plantation origin) woodland.



Table 8-7: NVC / UKHab Habitats within the Study Area

Habitat	UKHab	NVC	Conservation Status	GWDTE Potential	Evaluation and Justification
Grassland	g1b6 / g3c Other upland acid grassland / Other neutral grassland	U4 <i>Festuca ovina-Agrostis capillaris-Galium saxatile</i> grassland	N/A	N/A	Less than local The <i>Festuca ovina-Agrostis capillaris-Galium saxatile</i> grassland was recorded in a patch of self-set conifers scattered through with open grassland patches, in the centre of the Site. The grassland is species-poor, dominated by grasses such as red fescue, Yorkshire fog and sweet vernal-grass, with heath bedstraw and few other herbs present.
	g1b6 Other upland acid grassland	U5 <i>Nardus stricta-Galium saxatile</i> grassland	SBL	N/A	The <i>Nardus stricta-Galium saxatile</i> grassland was recorded in the grazed buffer area, primarily to the east of the Site. Both habitats are small in area and considered to provide minimal biodiversity value.
	g1c Bracken	U20 <i>Pteridium aquilinum-Galium saxatile</i> community	N/A	N/A	Less than local One small area of bracken <i>Pteridium aquilinum-Galium saxatile</i> was recorded in the grazed buffer to the north-east of the Site, where the bracken was dominant over a species poor understory. Bracken is a species-poor, widespread and abundant habitat. The small stands present within the survey are considered to be of less than local value.
	g2b Upland calcareous grassland	CG10 <i>Festuca ovina-Agrostis capillaris-Thymus praecox</i> grassland	SBL	High	Less than local Small patches of calcareous grassland were recorded within the grazed buffer to the north-east of the Site. These were too small to map, and in the context of the areas within the study area to be of less than local value.
	g3c Other neutral grassland	MG6 <i>Lolium perenne-Cynosurus cristatus</i> grassland	N/A	N/A	Less than local Some forest rides were marked as other neutral grassland with no NVC. These areas were dominated by grasses such as Yorkshire fog, red fescue and sweet vernal-grass with very few herbs and regenerating conifers scattered frequently throughout.
		OV27 <i>Epilobium angustifolium</i> community	N/A	N/A	
		No NVC	N/A	N/A	
	g3c / g3c7 Other neutral grassland /	MG9 <i>Holcus lanatus-Deschampsia</i>	N/A	Moderate	Less than Local The <i>Holcus lanatus-Deschampsia cespitosa</i> grassland was found throughout the Site in forest rides. The habitat is a species-poor, damp grassland with tall tufts of



Habitat	UKHab	NVC	Conservation Status	GWDTE Potential	Evaluation and Justification
	Deschampsia neutral grassland	<i>cespitosa</i> grassland			tufted hairgrass scattered through with Yorkshire fog, common sorrel and thistle species, often with rosebay willowherb frequent where the habitat is adjacent to OV27 habitat, though in general the habitat is low in species diversity and therefore considered to be of less than local value.
	g3c8 Holcus-Juncus neutral grassland	MG10 <i>Holcus lanatus</i> - <i>Juncus effusus</i> rush-pasture	N/A	Moderate	Less than Local Given that there are only small stands of this community present within the survey area, with low species diversity and therefore low botanical value, this feature has been assessed as less than local value.
Woodland	w1d Wet woodland	W4 <i>Betula pubescens</i> - <i>Molinia caerulea</i> woodland	SBL	High	Local An area of W4/W7 mosaics lie to the north of the Site. The area is scattered with self-set trees that are forming a canopy with mix of native broadleaves and non-native conifers. The area is a poor fit for W4 woodland, which should have purple moor-grass and very few other higher plants. It is possible this area is an open mire habitat (NVC M4 or M6) where conifers have begun to invade, closing up the canopy with the scattered broadleaved trees and thereby transitioning the habitat to woodland. The area is therefore not classified as Annex 1 bog woodland, but recognised under the SBL as a wet woodland.
		W6 <i>Alnus glutinosa</i> - <i>Urtica dioica</i> woodland	SBL	Moderate	Local The area marked as W6a was a poor fit for NVC as broadleaf woodland recovering on clearfell, but W6 was considered the closest likely NVC habitat to that found on Site. The area is dominated by young willow, alder and downy birch trees in a damp, slightly flushed area of clearfell.
		W7 <i>Alnus glutinosa</i> - <i>Fraxinus excelsior</i> - <i>Lysimachia nemorum</i> woodland	SBL	High	Local Areas of W7c <i>Deschampsia cespitosa</i> sub-community were located in small patches on the edges of the Site. The areas were dominated by a mix of birch, willow and alder with a damp understory dominated by soft rush.
	w1g Other broadleaved woodland	W10 <i>Quercus robur</i> - <i>Pteridium aquilinum</i> - <i>Rubus fruticosus</i> woodland	SBL	N/A	Local Stands of mixed woodland are present throughout the Site at the edge of conifer blocks, along riparian zones and as a long, larger area in the south-east of the Site. Most areas are predominantly conifer rather than broadleaved.



Habitat	UKHab	NVC	Conservation Status	GWDTE Potential	Evaluation and Justification
	w1h Other woodland; mixed	No NVC	N/A	N/A	One small area of broadleaf woodland (w1g) was recorded adjacent to the cemetery in the south of the Site. The area comprised a few mature broadleaved trees with a ground layer mostly dominated by ground elder.
	w1h/w1h6 Other woodland; mixed/Other woodland; mixed; mainly conifer	W14 <i>Fagus sylvatica-Rubus fruticosus</i> woodland	N/A	N/A	
	w1h5 Other woodland; mixed; mainly broadleaved	No NVC	N/A	N/A	
	w1h6 Other woodland; mixed; mainly conifer	No NVC	N/A	N/A	Less than Local The habitat is dominated by commercially planted conifer. Coniferous plantation is generally considered to have limited ecological value owing to a dominance of non-native species and low botanical diversity.
	w2b Other Scot's Pine woodland	No NVC	N/A	N/A	Local One small stand of mature Scot's pine exists to the north of the Site on the edge of the conifer plantation. The stand is open with plenty of light allowed through to the understory, allowing understory plants to thrive as they are unable to in areas of spruce and creating a higher diversity woodland habitat than the surrounding plantation. However, the area is small in the context of the wider environment and therefore only considered to have local value.
	w2c Other coniferous woodland	No NVC	N/A	N/A	Less than Local Large stands of coniferous plantation, dominated by Sitka spruce with some lodgepole pine, was the most dominant habitat within the Site. Coniferous plantation is generally considered to have limited ecological value owing to a dominance of non-native species and low botanical diversity.
Heathland and shrub	h1b Upland heathland	H9 <i>Calluna vulgaris-Deschampsia flexuosa</i> heath	SBL	N/A	Local A small area was categorised as <i>Calluna vulgaris-Deschampsia flexuosa</i> heath along a wide forest ride on a steep sloping bank. The habitat was species-poor with blaeberry dominant with scattered green-ribbed sedge and wavy hair-grass, over a carpet of pleurocarp mosses. The area appears to be grading from heath to grassland, with no heather and patches of acid grassland in the area. While dry heath is classified as Annex I habitat, this area of H9 onsite is small and in poor condition, representing a poor example of heath habitat.



Habitat	UKHab	NVC	Conservation Status	GWDTE Potential	Evaluation and Justification
	h3h Mixed scrub	No NVC	N/A	N/A	Local An area of mixed scrub was recorded in the south of the Site adjacent to the cemetery. The area comprised mostly raspberry, with rosebay willowherb, fern species, common nettle and tufted hairgrass. The archaeophyte, masterwort was recorded adjacent to the scrub area on the edge of the public footpath.
Wetland	f1a6 Degraded blanket bog	M19 <i>Calluna vulgaris-Eriophorum vaginatum</i> blanket mire	SBL	N/A	County The blanket bog within the Site has been categorised as degraded. While blanket bog can qualify as a priority habitat under Annex I of the 'Habitats Directive', due to the lack of peat forming Sphagnum species recorded on Site and degraded condition, the bog present is not considered to meet criteria as Annex I habitat or qualify as a peatland of national interest. In accordance with NatureScot (2023), while modified bog within the Site may not classify as an 'issue of national interest', it still classifies as 'priority peatland' for which the mitigation hierarchy outlined in NPF4 should be followed. As such, this habitat has been assessed as County level value. A large area of <i>Eriophorum vaginatum</i> blanket and raised mire exists on the top of Cairnoch Hill in mosaic with M19 blanket bog and U4 acid grassland. However, the area was covered in young self-set conifer with a lack of Sphagnum indicating degradation.
		M20 <i>Eriophorum vaginatum</i> blanket and raised mire	SBL	N/A	
		No NVC	SBL	N/A	
	f2c Upland flushes, fens and swamps	M6 <i>Carex echinata-Sphagnum recurvum/auriculatum</i> mire	SBL	High	Local Several flushes were recorded across the Site where small damp or waterlogged patches have distinct plant communities. Areas had minimal plant diversity or surface water and are considered to have relatively low biodiversity value.
		M10 <i>Carex dioica-Pinguicula vulgaris</i> mire	SBL	High	
	f2c8 Transition mires and quaking bogs; upland (H7140)	M4 <i>Carex rostrata-Sphagnum recurvum</i> mire	SBL, Annex 1	N/A	County M4 and M9 were recorded in small patches throughout the Site as target noted areas (below 400m ² in size) or as small mappable areas.
		M9 <i>Carex rostrata-Calliergon</i>	SBL, Annex 1	High	



Habitat	UKHab	NVC	Conservation Status	GWDTE Potential	Evaluation and Justification
		<i>cuspidatum</i> / <i>giganteum</i> mire			
	f2d Aquatic marginal vegetation	S4 <i>Phragmites australis</i> swamp and reed-beds	N/A	N/A	Local Patches of <i>Phragmites australis</i> were recorded on the shores of Carron Valley Reservoir to the south of the Site within the buffer. The areas are typical of regularly inundated loch or reservoir shore habitats and represent the transition of land to water. Marginal habitats can be high in biodiversity providing refuge, breeding areas and food for a number of invertebrates and vertebrates, however, given the flux in water level from mass water abstraction the littoral zone is likely depleted and as such this has only been assessed at local level.
		S27 <i>Carex rostrata</i> - <i>Potentilla palustris</i> tall-herb fen	N/A	N/A	
	f2f Other Wetlands	M23 <i>Juncus effusus</i> / <i>acutiflorus</i> - <i>Galium palustre</i> rush-pasture	N/A	High	Local The <i>Juncus effusus</i> / <i>acutiflorus</i> - <i>Galium palustre</i> rush-pasture was found throughout the Site in forest rides, in the buffer along the edge of Carron Valley Reservoir and in the open pasture. The areas are dominated by soft rush with a variety of damp loving herbs such as marsh marigold, marsh thistle, cuckooflower and marsh horsetail. This habitat usually represents a damp and modified habitat, often with low species diversity, however some M23 habitats onsite have some species richness and contribute towards a mosaic of damp, tall-herb habitats, particularly to the south of the Site, and some represent small herb rich flushes.
		M25 <i>Molinia caerulea</i> - <i>Potentilla erecta</i> mire	N/A	Moderate	
		M27 <i>Filipendula ulmaria</i> - <i>Angelica sylvestris</i> mire	N/A	Moderate	
		M28 <i>Iris pseudacorus</i> - <i>Filipendula ulmaria</i> mire	N/A	Moderate	
		S10 <i>Equisetum fluviatile</i> swamp	N/A	N/A	
		No NVC	N/A	N/A	
Urban	u1b5 Buildings	No NVC	N/A	N/A	Less than Local
	u1b6 Other developed land	No NVC	N/A	N/A	



Habitat	UKHab	NVC	Conservation Status	GWDTE Potential	Evaluation and Justification
	u1e Built linear features	No NVC	N/A	N/A	Urban features are primarily comprised of existing forestry tracks and small buildings to the south of the Site and are considered to have limited biodiversity value.
Sparsely vegetated land	s1a Inland rock outcrop and scree habitats	No NVC	N/A	N/A	County Two quarries were present within the Site for sand and gravel, one quarry to the east of the Site now contains a number of rare species including shepherd's cress, small cudweed and annual knawel, unique to the sparse rocky habitat created by the quarry and as such have been assessed as having county level importance.
	s1d Other inland rock	No NVC	N/A	N/A	
Rivers and lakes	r1 Standing open water and canals	No NVC	SBL	N/A	Local A number of small unnamed watercourses run through the Site, primarily functioning as drainage ditches for the conifer plantation within the Site. One unnamed watercourse to the north of the Site runs into the Endrick Water, and a second into the Earl Burn (River Carron Catchment). Rivers are an SBL priority habitat and as such have been assessed as having local value.
	r2b Other rivers and streams	No NVC	SBL	N/A	



Potential Groundwater Dependent Terrestrial Ecosystems

8.4.9 A total of 13 NVC communities were identified within the study area as vegetation communities considered to have GWDTE potential⁶. These are shown in **Figure 8.2.3** in **Technical Appendix 8.2** and are listed below.

Moderate Potential GWDTE

- CG10 *Festuca ovina-Agrostis capillaris-Thymus praecox* grassland;
- W4 *Betula pubescens-Molinia caerulea* woodland;
- W7 *Alnus glutinosa-Fraxinus excelsior-Lysimachia nemorum* woodland;
- M6 *Carex echinata-Sphagnum recurvum/auriculatum* mire;
- M10 *Carex dioica-Pinguicula vulgaris* mire;
- M9 *Carex rostrata-Calliergon cuspidatum / giganteum* mire; and
- M23 *Juncus effusus / acutiflorus-Galium palustre* rush-pasture

High Potential GWDTE

- MG9 *Holcus lanatus-Deschampsia cespitosa* grassland;
- MG10 *Holcus lanatus-Juncus effusus* rush-pasture;
- W6 *Alnus glutinosa-Urtica dioica* woodland;
- M25 *Molinia caerulea-Potentilla erecta* mire;
- M27 *Filipendula ulmaria-Angelica sylvestris* mire; and
- M28 *Iris pseudacorus-Filipendula ulmaria* mire.

8.4.10 All potential GWDTE were confirmed to be incidences of surface water or rain fed, and not groundwater fed (see **Chapter 10: Hydrology, Hydrogeology, Geology and Soils**).

Faunal Baseline

8.4.11 A summary of the protected or otherwise notable non-avian faunal species recorded within the relevant study areas during the various ecological surveys and/or for which records were provided during the desk study is provided below. Further details are provided in **Technical Appendices 8.3-8.5**.

Otter

8.4.12 The desk study did not identify any historical records of otter.

8.4.13 Evidence of otter was widely recorded during 2022 surveys. Results indicated watercourses within the Site were largely unsuitable for food provision due to poor fish habitat quality (e.g. low waterflow, steep gradient and water quality pressures from forestry) and likely only had potential for commuting between areas of suitable foraging habitat. This was confirmed by electrofishing surveys that identified no fish within watercourses surveyed in the Site. The Carron Valley Reservoir is an established brown trout fishery and likely the primary food source in the local landscape, and foraging for otter associated with the Site. Four resting locations (couches) were identified, however, none of these are within 30m of Proposed Development infrastructure (taken to be the typical disturbance buffer for non-breeding locations). No holts with potential for breeding were identified within the Site or a 200m buffer (taken to be the typical disturbance buffer for breeding locations).



- 8.4.14 Updated surveys in 2024 identified evidence of otter, as spraints, on four of the Site's unnamed watercourses, all of which occurred close to, or outwith, the Site boundary. Spraints were identified underneath bridges and culverts to the west, and south east of the Site supporting findings in 2022 that otter utilise these structures as commuting routes within the Site, and to/from the Carron Valley Reservoir.
- 8.4.15 No otter resting places were identified within the Site in 2024. One potential holt was noted approximately 240m outside the Site boundary to the north west, however, this is outwith the buffer for potential disturbance for works occurring within the Site and was not subject to additional survey.

Water Vole

- 8.4.16 No evidence of water voles was identified during surveys in 2022 or 2024, or by the desk study.
- 8.4.17 Watercourses and drainage ditches within the Site are largely unsuitable for water vole due to their location within an intensive forestry landscape. Morphology was unsuitable due to heavily modified nature, poor water quality (acidification is likely present as a result of forestry works) and a lack of preferential food sources (i.e. grasses, reeds and sedges) due to minimal light penetration from the dense canopy. Tributaries of the Endrick Water provided moderate suitability but were likely impacted by forestry in adjacent land. Watercourses east of the Site provided negligible suitability in either morphology or suitable foraging habitat.
- 8.4.18 As a result of no identified signs of water vole and habitat of negligible suitability, water vole has been scoped out of further assessment in this chapter.

Badger

- 8.4.19 The desk study did not identify any historical records of badger, however, anecdotal records from Forestry and Land Scotland (FLS), indicated the presence of at least two setts within the Site.
- 8.4.20 Badger setts were identified within the Site boundary during the surveys and included five setts (two main setts and two annexe sett), foraging signs and latrines. Four of the setts were located in the north of the Site and had signs indicating current use including fresh spoil heaps, guard hairs in sett entrances and nearby dung pits. One of the setts had been previously identified within a survey in 2022 when seven entrances were identified; a further three were identified in 2024 indicating continued use between this period.
- 8.4.21 Areas surrounding proposed turbine locations are primarily conifer plantation and are therefore unlikely to support additional setts and have minimal foraging suitability.

Pine Marten

- 8.4.22 The desk study identified records of pine marten within the Site in 2012. Anecdotal evidence from FLS also indicated that pine martens are utilising owl boxes within the Site.
- 8.4.23 Pine marten scats were identified throughout the Site and most commonly observed along forest tracks in 2024 surveys. Scat identification was confirmed via eDNA analysis. Similar evidence of activity was noted during 2022 surveys, in addition to confirmed presence during the desk study. No dens or potential dens were identified.
- 8.4.24 Wider habitat was optimal for pine marten with conifer plantation, mixed woodland and open habitats providing ample foraging opportunities and den sites through the presence of mature trees, tree fall, scattered rocks and log piles.



Red Squirrel

- 8.4.25 The desk study identified records of red squirrel within the Site in 2020.
- 8.4.26 Evidence of red squirrel was identified in 2022 and included feeding signs, one potential drey and an incidental red squirrel sighting nearby.
- 8.4.27 No evidence of red squirrel was identified in 2024, however, habitat is of high quality for red squirrels with good connectivity to the wider landscape via coniferous woodland and food availability, and as such red squirrel are assumed to be present. Two records of red squirrel in 2024 were present approximately 2km from the Site.
- 8.4.28 Grey squirrel, *Sciurus carolinensis*, may also be present, however, as an INNS (less than local value) it has been scoped out of further assessment in this chapter.

Bats

- 8.4.29 Desk study data returned from TWIC identified historic records relating to least five species of bats within 10km of the Site; common pipistrelle, soprano pipistrelle, Daubenton's bat, Natterer's bat, noctule, and unidentified species of the genera *Pipistrellus* and *Myotis*.
- 8.4.30 Details of the results of all bat surveys can be found within **Technical Appendix 8.4**, with a summary provided below.

Bat Habitat Suitability

- 8.4.31 The Site is considered to have low suitability for roosting bats due to the dominance of conifer species generally considered to be unsuitable for roosting bats due to cluttered drop zones from any roost feature. Built structures on the Site included dilapidated walls and a ruined building, where no features suitable for roosting were identified.
- 8.4.32 Three trees were subject to a full GLTA. All three trees were given a GLTA assessment of 'NONE'.
- 8.4.33 The Site is considered to be of high suitability for foraging and commuting bats. Habitats outwith conifer plantations largely comprised wet woodland, heath, degraded bog and neutral grassland. Open areas such as heath and grassland, and linear features such as forest rides and the Site's watercourses provide suitable foraging and commuting habitat for bats and connect the Site to the wider landscape.

Bat Activity (2024)

- 8.4.34 Activity surveys identified at least six species of bats using the Site: common pipistrelle (*Pipistrellus pipistrellus*); soprano pipistrelle (*Pipistrellus pygmaeus*); Nathusius' pipistrelle (*Pipistrellus nathusii*); *Pipistrellus* species; *Myotis* species; *Nyctalus* species; and brown long-eared bat (*Plecotus auritus*).
- 8.4.35 The most frequently recorded species within the Site was soprano pipistrelle, with a total of 7,856 passes recorded. This equates to 74.63% of the total bat passes recorded within the Site during the survey period. Common pipistrelle was the second most frequently encountered species within the Site, with a total of 2,442 passes recorded (averaging around 11.63 passes per night). This equates to 23.20% of total bat passes recorded within the Site during the survey period, with the *Pipistrellus* species accounting for 99% of recorded bats within the Site during the survey period. A summary of activity relating to each of these bat species is provided in **Table 8-8**.
- 8.4.36 The greatest number of passes overall and the greatest average number of passes per night was at Static A with a total of 3,322 passes over 20 nights equating to 166.10 passes



per night. The lowest activity was recorded at Static F, with a total of 101 passes over 30 nights averaging 3.37 per night. Refer to **Figure 8.4.2 in Technical Appendix 8.4: Bat Survey** for static locations in relation to turbine locations.

- 8.4.37 The Proposed Development was considered to present a medium initial risk level to populations of bat species based on the Site's suitability (overall moderate habitat risk based on a combination of low roost suitability and high foraging suitability and connectivity) and 'large' project size. Although the Proposed Development comprises less than 10 wind turbines thereby fitting into the 'small' project size category, blade tip is over 100m and there are other known wind energy developments within 5km and thus 'medium' project size was used under the precautionary principle.
- 8.4.38 Collision risk was considered to be 'High' for common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, and Nyctalus. No collision assessment for *Myotis* species was conducted as they are considered to be low flying and not a high collision risk, this includes Daubenton's bat (*Myotis daubentonii*) and Natterer's bat (*Myotis nattereri*).

Table 8-8: Summary of Bat Activity by Species (2024)

Species	Overall Risk Assessment	Justification	Activity Summary
Common pipistrelle	High	The overall Site collision risk during typical activity levels was considered to be 'medium' rising to 'high' during periods of peak activity. The collision risk to common pipistrelle was 'medium' at Static A increasing to 'high' during periods of peak activity. During periods of typical activity levels, the collision risk was 'low' at all other static locations.	2,442 passes recorded during the entire survey period, equating to 23.20% of total passes.
Soprano pipistrelle	High	The collision risk was 'high' at Static A, remaining 'high' during periods of peak activity. During periods of typical activity levels, the collision risk was 'low' at all other static locations. However, this risk increases to 'high' at Statics B, D, E and G, and 'medium' at Statics C, F and H during periods of peak activity. Based on activity levels and associated collision risk assessed for each sample location, and through applying a precautionary approach, the overall Site collision risk for soprano pipistrelle during typical activity levels can be classified as 'high' overall and during periods of peak activity.	7,856 passes recorded during the entire survey period, equating to 74.63% of total passes.
Nathusius' pipistrelle	Low	N/A	A single pass was recorded.
<i>Pipistrellus</i> species	High	The collision risk for all <i>Pipistrellus</i> species combined was 'high' at Static A, remaining 'high' during periods of peak activity. During periods of typical activity levels, the collision risk was 'low' at all other static locations. However, this risk increases to 'high' at every static location during periods of peak activity. Based on activity levels and associated collision risk assessed for each sample location, and through applying a precautionary approach, the overall Site collision risk for <i>Pipistrellus</i> species during typical activity levels can be classified as 'high' overall and remaining 'high' during periods of peak activity.	A further 126 passes attributed to either common or soprano pipistrelle. As a whole this genus accounted for over 99% of recorded bat passes.
<i>Myotis</i> species	N/A	N/A	82 passes recorded during the entire survey period, equating to 0.78% of total passes.
<i>Nyctalus</i> species	Low	The collision risk for <i>Nyctalus</i> species combined was 'low' at all static locations. Based on activity levels and associated collision risk assessed for each sample location, and through applying a	8 passes recorded during the entire survey period, equating to 0.08% of total passes



Species	Overall Risk Assessment	Justification	Activity Summary
		precautionary approach, the overall Site collision risk for <i>Nyctalus</i> species during typical activity levels can be classified as 'low', remaining 'low' during periods of peak activity.	
Brown long-eared bat	N/A	N/A	11 passes recorded during the entire survey period, equating to 0.10% of total passes.

Bat Activity (2022)

- 8.4.39 Due to the movement of turbines after the 2024 bat activity survey, data collected by three bat static detectors deployed during 2022 were additionally analysed to provide increased spatial coverage within the Site (Statics D, B and F, Refer to **Figure 8.4.2** in **Technical Appendix 8.4**) and to determine whether data collected in 2024 were representative of other locations within the Site.
- 8.4.40 Data from 2022 indicated similar species assemblages and activity levels to 2024 data, and the location of the detectors used in 2024 is therefore not considered a significant limitation to this assessment. This included the identification of at least six species of bats using the Site across the three bat static detectors analysed: *Myotis* species, Daubenton's bat, Natterer's bat, Noctule, *Pipistrellus* species, common pipistrelle; soprano pipistrelle; and brown long-eared bat.

Fish and Freshwater Pearl Mussel

- 8.4.41 Habitat assessments determined watercourses to be of mixed quality for fish within the Site. A total of seven watercourses were assessed ranging in suitability from poor (two locations) to moderate (five locations). Watercourses were additionally assessed for salmonid spawning potential, of the locations surveyed three were considered sub-optimal and the rest not suitable. Barriers to suitability included intensive forestry works, lack of riparian vegetation, visible erosion, low flow periods and barriers to movement (i.e. poorly constructed culverts and in-stream barriers).
- 8.4.42 No suitable watercourses for FWPM were identified within the Site. Consultation with NatureScot determined no FWPM records to be present for the Endrick Water, and it was agreed that they could be scoped out of assessment.
- 8.4.43 Fully quantitative electrofishing assessments took place in August 2024; no salmonids or other fish species were recorded. It is considered unlikely that migratory fish will be present within the upper reaches of the Site within all watercourses surveyed due to extreme fluctuating flow regimes, conifer plantation felling practices affecting water quality, potentially impassable infrastructure between the Site and the Carron Valley Reservoir, and the presence of two dams on the Carron Valley Reservoir without fish passes in addition to two impassable features on the Endrick Water and River Carron.
- 8.4.44 The mechanisms for migratory brown trout, also referred to as sea trout, are not hereditary, as such any brown trout is physically capable of undergoing the physiological transformation needed to migrate to sea. Environmental stressors, such as lack of food and resource availability will cause the change, however, in resource rich environments fish typically remain as resident brown trout. As such sea trout may be present, in low volumes, within the Carron Valley Reservoir. Adult sea trout will not be able to migrate into the Carron Valley Reservoir to spawn, however, due to impassable barriers (natural and man-made).



- 8.4.45 Powan (*Coregonus lavaretus*) are known to occur in Carron Valley Reservoir, downstream of tributaries within the Site following a translocation from Loch Lomond.
- 8.4.46 No lamprey were identified during surveys, however, both river and brook lamprey are qualifying interests of the Endrick Water SAC, as such have assumed presence downstream of the Site. River lamprey are unlikely to be situated above impassable barriers due to migratory behaviour (in this case migration is limited to Loch Lomond), however, brook lamprey are non-migratory and may be present in sections of the Endrick Water upstream from impassable falls at the Loup of Fintry.

Herptiles

- 8.4.47 Habitat suitable for GCN was identified in two pond locations. Subsequent eDNA surveys confirmed absence of the species, as such GCN has been scoped out of further assessment in this EIA Report chapter.
- 8.4.48 Suitable habitat for common amphibian and reptile species including common frog (*Rana temporaria*), common toad (*Bufo bufo*) and common lizard exists within the Site. Incidental sightings of common lizards were observed in 2024 and 2022, and one of common toad in 2024. It is assumed that all three species are present within the Site.

Deer

- 8.4.49 Four species of deer: roe (*Capreolus capreolus*); red (*Cervus elaphus*); fallow (*Dama dama*); and sika (*Cervus nippon*) were identified within the 10km² British Deer Society monitoring grid during the desk study. Fallow and sika deer are both introduced species and considered non-native in Scotland.
- 8.4.50 Roe deer were widely observed during the surveys in 2024 as incidental sightings.

Hares

- 8.4.51 Brown hares (*Lepus europaeus*) were observed widely during the surveys of 2024 as incidental sightings and were noted as occurring within Craigengelt Wind Farm by the desk study.
- 8.4.52 Mountain hare (*Lepus timidus*) was noted as occurring on Earlsburn North Wind Farm by the desk study.

Evaluation of Faunal Species

- 8.4.53 An evaluation of the non-avian faunal species which are either known to be present or considered likely to be present within the study area, is provided in **Table 8-9** in addition to the reasoning for assigning importance.



Table 8-9: Evaluation of Non-avian Faunal Species

Feature	Evaluation and Reasoning
Mammal Species	
Otter	Local Otter is a European Protected Species and is listed within the SBL as a species of principal importance for biodiversity conservation in Scotland. With such protection, the otter has become widespread locally and nationally, with the Scottish population current estimated to be around 8,000³². Otters have large home territories which can range up to 50km within inland waterways for males and 24km for females. Otter activity was detected within the Site boundary, and on connective watercourses, although no breeding holts were recorded and watercourses within the Site were largely unsuitable for food provision and likely only had potential for commuting between areas of suitable foraging habitat located offsite.
Badger	Local Badgers are protected under the Protection of Badgers Act 1992, as amended by the WANE Act 2011. Badgers are recognized to maintain healthy population sizes in Scotland and are widely distributed throughout the Scottish mainland³³. Five badger setts were recorded within northern areas of the Site. The setts displayed signs of recent use with associated foraging and territorial behaviour.
Pine marten	Local Pine marten receives full protection under Schedule 5 of the Wildlife and Countryside Act 1981 and is listed within the SBL, highlighting its importance for biodiversity conservation in Scotland. Pine martens were historically persecuted, although recovering the species is relatively rare with Scotland's population estimated at 3,700 adult individuals³⁴. The Site contains suitable habitat for pine marten with presence confirmed within the Site boundary via eDNA analysis of scats, although no dens or potential dens were recorded.
Red squirrel	Local Red squirrel receives full protection under Schedule 5 of the Wildlife and Countryside Act 1981 and is listed within the SBL, highlighting its importance for biodiversity conservation in Scotland.

³² NatureScot. (2024). Otter. [Online] Available at: <https://www.nature.scot/plants-animals-and-fungi/mammals/land-mammals/otter>

³³ NatureScot. (2024). Badgers. [Online] Available at: <https://www.nature.scot/plants-animals-and-fungi/mammals/land-mammals/badger#:~:text=Though%20seldom%20seen%20by%20us%2C%20the%20badger%20%E2%80%93%20distribution%20across%20mainland%20Scotland%20and%20easily%20recognisable%20form.>

³⁴ NatureScot. (2024). Pine Marten. [Online] Available at: <https://www.nature.scot/plants-animals-and-fungi/mammals/land-mammals/pine-marten>



Feature	Evaluation and Reasoning
	The Site contains areas of suitable habitat for red squirrel with good connectivity and feeding opportunities. Historical presence within the Site, and recent presence in adjacent habitats means some use of the Site is likely.
Bats	Local All UK bat species are European protected species and receive full protection under the Wildlife and Countryside Act 1981, with some individual species included on the SBL, highlighting their importance for biodiversity conservation in Scotland. The Site contains low roosting potential as a result of the commercially planted conifer woodland that dominates the habitats within the Site but high potential for foraging and commuting within forest rides and other (non-plantation) habitats. Bat activity surveys identified at least six species of bats to currently use the Site: common pipistrelle; soprano pipistrelle; Nathusius' pipistrelle; <i>Pipistrellus</i> species; <i>Myotis</i> species; <i>Nyctalus</i> species; and brown long-eared bat, of which the <i>Pipistrellus</i> species accounted for 99% of all records within the Site.
Brown hare	Less than Local Brown hare is afforded minimal protection in Scotland and is culled in some agricultural areas. Brown hare numbers have declined historically, however, populations appeared to have recovered and stabilized over Scotland. Incidental sightings of brown hare were observed throughout the Site.
Deer (sp.)	Less than Local Deer are afforded minimal protection in Scotland, primarily in relation to culling methods, close seasons and protection against suffering. Deer form an important aspect of Scotland's biodiversity, however, excessive numbers and lack of predators can result in negative grazing pressures. One species of deer, roe deer, was observed within the Site as incidental sightings with a further three species, red, sika and fallow known to occur in the wider area. Only red and roe deer are native species, fallow and sika occur as a result of previous introductions.
Fish Species	
Powan	National Powan is afforded full protection through inclusion in Schedule 5 of the Wildlife and Countryside Act 1981 and is a SBL species. Powan is arguably the rarest fish in Scotland and is endemic to only two lochs in Scotland (Loch Lomond and Loch Eck), the Carron Valley represents one of six refuge populations and one of three lochs to contain the Loch Lomond phenotype that are under risk from the invasive ruffe, <i>Gymnocephalus cernua</i>.



Feature	Evaluation and Reasoning
	Multiple surveys have confirmed the status of powan as well established ³⁵ within the Carron Valley Reservoir since introduction in 1988 and 1990. The Site has several watercourses running into the Carron Valley Reservoir.
Brown trout	Local No brown trout were identified within the Site, however, Carron Valley Reservoir and the Endrick Water are both established wild brown trout fisheries. The Site has several watercourses running into the Carron Valley Reservoir and the Endrick Water, which could potentially support brown trout populations. The species is considered a valuable food sources for otter and birds, and as such considered of local value to support other species.
Atlantic salmon	International Atlantic salmon is a qualifying interest of the Endrick Water SAC, which is hydrologically connected to the Site. It is also included in the SBL. No Atlantic salmon were identified within the Site, however, they have a known presence on the Endrick Water downstream of the Loup of Fintry as a qualifying interest of the Endrick Water SAC.
Lamprey (river and brook lamprey)	International Both brook and river lamprey are qualifying interests of the Endrick Water SAC, which is hydrologically connected to the Site. They are also both included in the SBL. No lamprey were identified within the Site, however, they have a known presence on the Endrick Water downstream of the Loup of Fintry as qualifying interests of the Endrick Water SAC. Brook lamprey may also occur on the Endrick Water above the falls.
Herptiles	
Reptiles: Common lizard	Local All native reptiles in Scotland, including common lizard, are protected against intentional or reckless killing and injury under the Wildlife and Countryside Act 1981 (as amended). Common lizard has been recorded incidentally within the Site, although large parts of the Site are dominated by conifer plantation forestry, which is unsuitable for the species.
Amphibians: Common toad and	Less than Local Common toad and common frog are protected under the Wildlife and Countryside Act 1981 (as amended), but only against trade. Common toad is included in the SBL.

³⁵ Adams, C. E., Lyle, A. A., Dodd, J. A., Bean, C. W., Winfield, I. J., Gowans, A. R. D., Stephen, A. and Maitland, P. S. (2014). Translocation as a conservation tool: case studies from rare freshwater fishes in Scotland. *The Glasgow Naturalist*. 26(1): 17-24.



Feature	Evaluation and Reasoning
common frog	Suitable habitat for common amphibian species exists within the Site and one incidental sighting of common toad was made in 2024. It is assumed that both species are present within the Site, although the Site is considered unlikely to be of great importance for them given the nature of the habitats present.
Invertebrates	
Terrestrial invertebrates	Local A number of terrestrial invertebrates were identified in the desk study including orange-tip (<i>Anthocharis cardamines</i>), small heath (<i>Coenonympha pamphilus</i>), common hawker (<i>Aeshna juncea</i>), large red damselfly (<i>Pyrrosoma nymphula</i>), red-necked footman (<i>Atolmis rubricollis</i>) and (<i>Epirrhoe tristate</i>), although most such species are relatively common and widespread.
Aquatic invertebrates	Less than Local Watercourses within the Site were considered to have poor habitat for aquatic invertebrate species, as such species of high biodiversity value are likely not present.



Future Baseline

- 8.4.54 In the absence of the Proposed Development, the majority of the Site is likely to remain as forestry plantation. Whilst the precise distribution of habitats within the Site is likely to change over time in response to forestry rotational management, no substantial changes to the habitats within the Site are anticipated in the foreseeable future.
- 8.4.55 Beaver is present within the lower reaches of the Endrick Water following a reintroduction in 2023. Previous analysis of catchment permeability suggests most catchments are likely to be permeable to beaver dispersal (Stringer *et al.*, 2015). A Strategic Environmental Assessment (“SEA”) mapped likely dispersal routes in the medium-long term and suggests beavers are likely to continue to make their way up the Endrick Water, however, there is very little suitable habitat predicted around the reservoir. Whilst colonisation of the Site is therefore unlikely, it is possible that beaver may at least pass through the Site in future.
- 8.4.56 To allow for the possible changes in the distribution of protected species within the Site over time, pre-construction surveys for protected mammal species (badger, pine marten, red squirrel and otter) would be undertaken to ensure legislative compliance during construction (refer to Section 8.5).
- 8.4.57 Climate change is predicted to result in complex changes to biodiversity. This may result in changes to the vegetation present or the potential for new species to colonise the Site as environmental conditions fall within survivable limits, and other species to reduce in coverage; the extent of change cannot be accurately predicted at this time. In the absence of detailed, quantifiable information it has been assumed that in the absence of the Proposed Development the ecological condition of the Site is unlikely to change significantly over the next 40 years.

8.5 Embedded and Standard Mitigation Measures

Embedded Mitigation Measures

- 8.5.1 Embedded mitigation measures are those measures that are inherent to the Proposed Development. This includes mitigation by design (also known as primary mitigation), implemented through design iteration works as described in **Chapter 2: Design Evolution and Alternatives**. This includes movement and removal of wind turbines, re-routing of access tracks and siting of infrastructure away from sensitive habitats and outwith a 50m buffer from watercourses.
- 8.5.2 In line with current CIEEM guidelines, the assessment of likely significant effects is carried out on the basis of embedded design and standard good practice mitigation measures being in place during construction. The following embedded design measures have been applied to the design so that effects on IEFs are avoided or reduced:
- Avoidance of areas of deeper peat of higher quality and condition (i.e. areas of blanket bog >1 m depth) and other habitats of significant conservation value (i.e. Annex I habitats), and consideration of areas with the potential to support protected and notable species in relation to the location of turbines and associated infrastructure, as far as practicable.
 - Existing forestry tracks would be used where practicable in order to reduce the footprint of the Proposed Development and to limit the number of new watercourse crossings. Some upgrading is required to existing tracks, to create a suitable running width and facilitate use by larger vehicles (e.g. abnormal loads).



- Electrical infrastructure cabling would be installed alongside tracks, wherever practicable, to further minimise any risk of habitat loss.
- Wind turbines, infrastructure and access tracks have been sited, wherever practicable, to maintain a minimum of 50m buffers from watercourses.
- A distance of at least 50m between wind turbine blade tip and the nearest suitable woodland has been established as per current bat guidance⁶ based on the implementation of a buffer of 104.5m from the wind turbine base, assuming an average tree height of 20m.
- In line with current good practice, feathering, i.e. the reduction of rotation speed while the turbine is idling (based on the findings of Arnett *et al.* (2013)³⁶, will be implemented throughout wind farm operation. In respect of feathering current NatureScot *et al.* guidelines state: *“The reduction in speed resulting from feathering compared with normal idling may reduce fatality rates by up to 50%. As this option does not result in any loss of output, as best practice, it is recommended wherever it is practically possible and there remains uncertainty over the risk posed to bats. It can be applied at any site with a blade pitch control system which can be automated using SCADA [Supervisory Control and Data Acquisition] data”*.

Good Practice Mitigation Measures

- 8.5.3 Full details of construction mitigation measures would be provided in a CEMP. An Outline CEMP is included as **Technical Appendix 3.1**. Good practice measures in relation to pollution risk, prevention of INNS spread and sediment management to be adopted during the construction and operation phases are also set out in **Chapter 10: Hydrology, Hydrogeology, Geology and Soils**. During the construction phase, good practice techniques with respect to peatland environments, as contained within ‘Good Practice during Windfarm Construction’¹³, would be implemented. Further details on peat and water management during construction are provided in **Chapter 10** and **Technical Appendix 3.1**.
- 8.5.4 Good practice measures to protect retained habitats during the construction phase would be implemented, including the erection of temporary protective fencing demarcating the working footprint, to be overseen and policed by an Ecological Clerk of Works (ECoW) (see below). Good practice techniques for vegetation and habitat reinstatement would be adopted and implemented on areas subject to disturbance during construction as soon as is practicable.
- 8.5.5 Good practice measures to avoid or reduce harm to protected and notable faunal species during the construction phase include:
- Site speed limits of 15mph would reduce the likelihood of accidental injury/killing of IEFs by construction traffic (notably otter, badger and pine marten);
 - All potentially dangerous substance or materials within the temporary construction compounds would be carefully stored to prevent them causing any harm to mammals which may enter the compound at night (e.g. otter, badger and pine marten); and

³⁶ Arnett, E. B., Johnson, G. D., Erickson, W. P. and Hein, C. S. on behalf of The National Renewable Energy Laboratory (2013) A Synthesis of Operational Mitigation Studies to Reduce Bat Fatalities at Wind Energy Facilities in North America.



- During construction all excavations greater than 1m depth would either be covered at night or designed to include a ramp to allow otter and other animals a means of escape should they fall in.
- 8.5.6 A suitably qualified ECoW would be appointed prior to the commencement of any construction activities. The ECoW would have sufficient powers to identify where mitigation measures are required, authorise temporary stoppage of works (if required) and review working methods and advise whether alternative or more appropriate working methods are required.
- 8.5.7 The role of the ECoW would include the following tasks:
- To give toolbox talks to all staff onsite, e.g., an ecological induction, so staff are aware of the ecological sensitivities on the Site and the legal implications of not complying with agreed working practices;
 - To mark out areas of sensitive habitats and/or notable plant species to protect these from indirect effect such as vehicle damage, where loss can be avoided;
 - To agree and monitor measures designed to minimise damage to retained habitats and proposed peatland management areas;
 - To undertake pre-construction surveys and checks for protected species and advise on ecological issues where required; and
 - To carry out pre-construction inspections of areas which require reptile mitigation and supervision of mitigation works, where required.
 - The ECoW would also undertake additional roles such as assisting with hydrological measures or checking for nesting birds (see **Chapter 9: Ornithology** and **Chapter 10: Hydrology, Hydrogeology, Geology and Soils**).
- 8.5.8 Dedicated Species Protection Plans (SPP) would be produced for protected species that are known to be present within the Site, including otter, badger, pine marten and red squirrel. SPPs would be agreed prior to construction commencement and then implemented during the construction period, and immediately prior if required. The SPPs will include, but not be restricted to:
- Measures to safeguard protected species known to be in the area based on existing survey data updated by pre-construction survey data (see below) and including good practice measures to minimise ecological impact during all construction activities (such as sensitive lighting, ramps exiting open excavations, consideration of key foraging areas, etc.).
 - A description of the process to be followed in the case that new protected or notable species are recorded on-site that will therefore also need to be protected during construction works and ensuring the implementation of effective toolbox talks to raise awareness of Site personnel to sensitive ecological features on Site.
- 8.5.9 A specific monitoring regime for aquatic ecology including electrofishing, macroinvertebrate monitoring and water quality would be compiled and agreed with Stirling Council following consultation with relevant bodies within a combined water quality and fisheries monitoring plan (WQFMP). Proposed monitoring would be conducted in line with Marine Directorate guidance for monitoring watercourses in relation to onshore wind farm developments: generic monitoring programme (Marine Directorate, 2021). The WQFMP would include:
- Water quality sampling would be carried out at least 12 months prior to construction commencing, during construction and for at least 12 months after



construction is complete. The water quality monitoring plan would include key hydrochemical parameters, turbidity, and flow data, the identification of sampling locations (including control sites), frequency of sampling, sampling methodology, data analysis and reporting etc.;

- The WQFMP would include fully quantitative electrofishing surveys at sites potentially impacted and at control sites for at least 12 months before construction commences, during construction and for at least 12 months after construction is completed to detect any changes in fish populations; and
- Appropriate site-specific mitigation measures detailed in the EIA and in agreement with the Planning Authority.

8.5.10 Any requirement for lighting both during construction, during operation and decommissioning, will be sensitively designed to avoid illumination of bat commuting/foraging areas, particularly avoiding the summer activity months as well as minimising any physical barriers to the movement of bats over or under any new infrastructure.

8.5.11 In order to prevent pollution of watercourses within the Site (with particulate matter or other pollutants such as hydrocarbons and suspended solids), good practice techniques, as well as a robust sedimentation strategy, will be employed and these will be set out in the Pollution Prevention Plan (PPP) and Environmental Incident Response Plan (EIRP) which will form an integral part of the CEMP. These measures are set out in the outline CEMP provided in **Technical Appendix 3.1** and further details would be agreed with Stirling Council, in consultation with NatureScot and SEPA, post-consent and prior to the construction of the Proposed Development.

Pre-Construction Surveys

8.5.12 Due to the time that will have elapsed since the surveys undertaken in 2024, it is possible that the presence and home ranges/territories of protected species within the Site will have changed by the time construction commences. This is relevant for otter, pine marten, red squirrel, badger and roosting bats. A pre-construction walkover survey for protected species, following relevant good practice methods, would therefore be undertaken to identify changes to the baseline and to inform the development of the relevant SPPs. The survey would cover all watercourses other areas of suitable habitat within up to 200m of any areas that would be affected by construction works.

Measures to Avoid Killing or Injury to Reptiles

8.5.13 In order to comply with the Wildlife and Countryside Act 1981 (as amended in Scotland) mitigation would be employed to reduce the chances of inadvertently killing or injuring individual reptiles during construction works. Given the low numbers of reptiles likely to be present, the large areas of suitable habitat that would remain unaffected by the works and given also the large spatial scale of the works, fencing and translocation are not considered appropriate. Proposed mitigation therefore would involve identification and removal of potential refugia and hibernacula within areas of suitable habitat, if present. The proposed Site speed limit of 15mph would also reduce the likelihood of accidental injury/killing of reptiles by construction traffic.

8.5.14 Where appropriate and safe to do so, during the active season for reptiles (typically April to October) all potential refuges within construction working areas would be removed, and construction works will employ a 'soft start' to allow any individuals to exit the area. Outwith the active season, checks and removal of hibernacula



would be conducted. These checks will be conducted under the guidance of the ECoW.

8.6 Scope of Assessment

Important Ecological Features Scoped Out

8.6.1 Following the collection of baseline data, and following the implementation of embedded and standard mitigation measures, several potential IEFs can be scoped out of further assessment. Features which are scoped out of further assessment are detailed in **Table 8-10**. The ecological features listed in **Table 8-10** have been excluded from further assessment for at least one of the following reasons:

- The feature is considered likely to be absent from the Site;
- The features is not considered 'important' at a local level or above; and/or
- While present, or potentially present, at the Site the feature is unlikely to be affected as a result of the Proposed Development.

Table 8-10: Important Ecological Features Scoped out of Assessment

Important Ecological Feature	Justification for Scoping Out of Further Assessment
Statutory Designated Sites	
Denny Muir SSSI	The SSSI is situated 3.5km east/southeast of the Site. Considering the terrestrial habitat designations of the SSSI: subalpine acid grassland, blanket bog and basic fen no loss or deterioration of the habitats would occur given the distance from the Site. The SSSI is also not hydrologically connected to the Site and as such there is no pathway for effect.
Double Craigs SSSI	The SSSI is situated 3.5km north/northwest of the Site. Given the SSSI is designated for subalpine calcareous grassland, no loss or deterioration of the habitats would occur given the distance of the SSSI in relation to the Site and as such there is no pathway for effect.
Carron Glen SSSI	The SSSI is situated 3.8km east of the Site. Given the terrestrial habitat designations of the SSSI: upland oak woodland, upland mixed ash woodland and lowland neutral grassland, no loss or deterioration of the habitats would occur given the distance of the SSSI in relation to the Site. The SSSI is also not hydrologically connected to the Site and as such there is no pathway for effect.
Sauchie Craig Wood SSSI	The SSSI is situated 6.0km northeast of the Site and designated for its upland mixed ash woodland. No habitat loss or deterioration would occur as a result of the Proposed Development. Given also that the SSSI is not hydrologically connected to the Site there is no pathway for effect.
Dullatur Marsh SSSI	The SSSI is situated 6.8km south east of the Site and designated for its hydromorphological mire range. No habitat loss or deterioration would occur as a result of the Proposed Development given the intervening distance. Given also that the SSSI is not hydrologically connected to the Site there is no pathway for effect.
Sculliongour Limestone Quarry SSSI	The SSSI is situated 7.9km east of the Site and designated for its lowland calcareous grassland. No habitat loss or deterioration would occur as a result of the Proposed Development given the intervening distance. Given also that the SSSI is not hydrologically connected to the Site there no pathway for effect.
Balglass Corries SSSI	The SSSI is situated 8.1km west of the Site and designated for its blanket bog habitat and upland plant assemblage. No habitat loss or deterioration would occur as a result of the Proposed Development given the intervening distance. Given also



Important Ecological Feature	Justification for Scoping Out of Further Assessment
	that the SSSI is not hydrologically connected to the Site there is no pathway for effect.
Wester Balgair Meadow SSSI	The SSSI is situated 8.9km west/northwest of the Site. The SSSI is designated for a range of terrestrial habitat types including lowland dry heath, lowland wet heath, valley fen and lowland neutral grassland. No habitat loss or deterioration would occur as a result of the Proposed Development given the intervening distance. Given also that the SSSI is not hydrologically connected to the Site there is no pathway for effect.
Arnprior Glen SSSI	The SSSI is situated 9.6km northwest of the Site and designated for its upland mixed ash woodland habitat. No habitat loss or deterioration would occur as a result of the Proposed Development given the intervening distance. Given also that the SSSI is not hydrologically connected to the Site there is no pathway for effect.
Shirgarton Moss SSSI	The SSSI is situated 9.7km northwest of the Site and designated for raised bog habitat. No habitat loss or deterioration would occur as a result of the Proposed Development given the intervening distance. Given also that the SSSI is not hydrologically connected to the Site there is no pathway for effect.
Flanders Moss SSSI, SAC, NNR	The designated sites are all situated 9.7km northwest of the Site and designated for their active raised bog and degraded raised bog habitats, in addition to the moth assemblage and the spider <i>Heliophanus dampfi</i> . No habitat loss or deterioration would occur as a result of the Proposed Development given the intervening distance. Given also that the designated sites are not hydrologically connected to the Site there is no pathway for effect.
Non-Statutory Designated Sites	
Carron Valley Reservoir and Forest Local Nature Conservation Site (LNCS)	The Site is located 0.2km from the Site so will not be directly affected by the Proposed Development. A number of watercourses within the Site drain directly into the Carron Valley Reservoir, however, of these only one is at risk of construction related pollution from turbines (the unnamed watercourse forming the eastern Site boundary). A number of smaller watercourses are subject to watercourse crossings, however, these form part of the existing network of FLS forestry tracks within the Site. Although upgrades are needed these are not anticipated to be significant and felling would be minimal in these areas, limited to within 30m of the access track. Considering the volume of water present in the reservoir, any temporary pollutants mobilised during the construction phase (e.g. suspended solids) would be quickly diluted beyond discernible effect. Moreover, when considering the embedded and standard mitigation measures including minimum distances of 50m between infrastructure and watercourses, minimal works required to the relevant access tracks (closest infrastructure) due to existing forestry tracks being utilised and water quality/biotic monitoring that would be undertaken, deterioration of water quality is not likely to be sufficient to cause harm to fish or other ecological features in the Carron Valley Reservoir.
Carron Forest LNCS	The LNCS is designated for forestry at a distance of 0.8km southeast of the Site. Considering that no habitat will be lost within the LNCS and that there is no functional hydrological connectivity to the Site (it is located on the other side of the Carron Valley Reservoir) there is limited connectivity to the Proposed Development that would result in any likely significant effect.
Upper Endrick Water LNCS	The LNCS is located 1.0km west of the Site, but approximately 2.24km downstream of the closest connective tributary within the northwestern corner of the Site. No loss of habitats: deciduous woodland, bog or marsh habitats would incur as a result of the Proposed Development, nor is a significant decrease in water quality likely given the intervening distance. Moreover, when considering the embedded and standard mitigation measures including minimum distances of 50m between infrastructure and watercourses, minimal works required to the access track



Important Ecological Feature	Justification for Scoping Out of Further Assessment
	(closest infrastructure) due to existing forestry tracks being utilised and water quality/biotic monitoring that would be undertaken, deterioration of water quality is not considered to be sufficient to result in detectable effect on water quality.
Habitats	
Habitats	All habitats have been considered in terms of habitat loss within the assessment (see Table 8-12). Only habitats considered to have local or higher value, and which would potentially be subject to direct or indirect effects, have subsequently been scoped in for detailed assessment. For clarity, the following habitats (UKHab codes in brackets) are scoped out of further assessment: • Upland acid grassland (g1b6); • Bracken (g1c); • Upland calcareous grassland (g2b); • Other neutral grassland (g3c/g3c7); • Holcus-juncus neutral grassland (g3c8); • Other woodland mixed, mainly conifer (w1h6); • Coniferous woodland (w2c); and • Urban features (u1b5, u1b6, u1e).
Ground Water Dependent Terrestrial Ecosystems (GWDTE)	GWDTE have been scoped out of further assessment. A detailed assessment within Chapter 10: Hydrology, Hydrogeology, Geology and Soils looked at a number of NVC communities with potential to support GWDTEs. However, these communities were all determined to be supported by surface water logging and surface run-off as opposed to being groundwater-fed. As such GWDTE have been scoped out of further assessment.
Invasive Non-native Species (INNS)	The introduction and spread of INNS have been scoped out of further assessment. The presence of INNS identified during habitat surveys is limited to a single, discrete stand of giant hogweed, <i>Heracleum mantegazzianum</i> , just outwith the Site boundary and located c. 85m away from the nearest infrastructure (the Site entrance) so unlikely to be affected by the Proposed Development. Moreover, embedded and standard mitigation measures (refer to Section 8.5) are inclusive of measures to prevent and restrict the transfer of INNS within the Site during the construction phase.
Protected Species	
Badger	A total of five setts were identified within the Site. The closest sett was located approximately 100m from the nearest proposed infrastructure, an existing forestry track that will be widened and upgraded as part of the Proposed Development. Given this distance exceeds the recommended NatureScot disturbance buffer of 30m for lower disturbance works this is considered unlikely to result in disturbance of badgers. Loss of suitable habitat for badgers will be relatively small (Table 8-12) and large areas of suitable habitat will be retained. Moreover, embedded and standard mitigation measures (refer to Section 8.5) include a range of measures to avoid or reduce potential effects on badgers, including pre-construction surveys and production and implementation of a SPP. On the basis of the above, significant effects on badgers are unlikely and detailed assessment is not required.
Water Vole	No confirmed signs of water vole were recorded during field surveys and habitat suitability for water vole within the Site was generally low. Given the lack of desk and field-based evidence obtained, water vole is considered likely absent from the Site. Embedded mitigation (refer to Section 8.5) includes pre-construction surveys for protected species which would identify the presence of water vole in the unlikely event that they become established in the period between



Important Ecological Feature	Justification for Scoping Out of Further Assessment
Otter	Surveys in 2022 and 2024 indicated use of watercourses within the study area (confirmed via spraint distribution), however, these were located primarily on watercourses outwith the Site or on the Site boundary. No resting locations or potential breeding locations were identified with 30m or 200m respectively of any proposed infrastructure and usage of the Site is considered likely to be largely restricted to commuting with very limited foraging potential. As such, there is a minimal pathway for disturbance (taken to be the NatureScot advised disturbance buffer for non-breeding and breeding sites). Habitat loss for otters will be minimal (Table 8-12) and the vast majority of watercourses will be unaffected by the Proposed Development. Moreover, embedded and standard mitigation measures (refer to Section 8.5) include a range of measures to avoid or reduce potential effects on otters, including pre-construction surveys and production and implementation of a SPP. On the basis of the above, significant effects on otters are unlikely and detailed assessment is not required.
Pine Marten	Evidence of pine marten scats was recorded during both the 2022 and 2024 surveys; these were concentrated around existing forestry tracks within the Site, suggesting use for commuting around the Site. Evidence of pine marten has also been recorded at other existing and proposed wind farm sites in the wider landscape. As such they are considered to be abundant and widespread in the region. Although individuals are known to utilise the Site (confirmed through scat presence), no dens or potential dens were identified, as such no disturbance or loss of dens is predicted. It is acknowledged that dens may be present within the interior of forestry blocks that were not accessible for thorough survey, although this is thought to be unlikely due to the high quality of the woodland coupes, showing a distinct lack of windthrow and other denning opportunities. Embedded and standard mitigation measures (refer to Section 8.5) include a range of measures to avoid or reduce potential effects on pine marten, including pre-construction surveys and production and implementation of a SPP. Moreover, areas of long-term forestry retention will occur within the Site will ensure ongoing provision of suitable habitat and areas free of disturbance during the construction phase. On the basis of the above, significant effects on pine marten are unlikely and detailed assessment is not required.
Red Squirrel	Minimal evidence of red squirrel was identified throughout the Site limited to three squirrel feeding signs (not confirmed to be red squirrel) and one potential drey situated in excess of 100m from the nearest proposed infrastructure. As such no disturbance to red squirrel dreys are predicted (following NatureScot's advised disturbance buffer of 50m for breeding dreys and 5m during the non-breeding season). Embedded and standard mitigation measures (refer to Section 8.5) include a range of measures to avoid or reduce potential effects on red squirrel, including pre-construction surveys and production and implementation of a SPP. Moreover, areas of long-term forestry retention will occur within the Site will ensure ongoing provision of suitable habitat and areas free of disturbance during the construction phase. On the basis of the above, significant effects on red squirrel are unlikely and detailed assessment is not required.
Freshwater Pearl Mussel (FWPM)	There is no evidence of presence of FWPM within the Endrick Water catchment, and a lack of suitable habitat present within the Site and adjoining watercourses means presence is very unlikely. Correspondence with NatureScot confirmed that it was acceptable to scope FWPM out of further surveys (refer to Table 8-3) and therefore it follows that FWPM can be scoped out of further assessment.
Anadromous Fish	A significant number of impassable barriers are present within or downstream of the Site (both natural and man-made) including the Carron Valley Reservoir (two impassable dams on either side), Loup of Fintry (impassable falls on the Endrick Water) and an impassable waterfall on the River Carron. As such, anadromous / migratory fish would be unable to access the Site and the closest distance at which



Important Ecological Feature	Justification for Scoping Out of Further Assessment
	such species could be present is approximately 3.5km downstream. This includes Atlantic salmon and sea trout. Electrofishing surveys within the Site did not identify either species. Given the distance downstream and the embedded and standard mitigation measures that would be employed (refer to Section 8.5) including a 50m buffer of infrastructure from watercourses, pollution prevention measures and water quality and biotic monitoring, pollution is unlikely to occur in concentrations sufficient to cause injury and/or mortality to either species.
Non-migratory Fish	No fish were identified within the Site during electrofishing surveys. A number of records of loch dwelling, non-migratory fish exist in the downstream Carron Valley Reservoir. This includes powan, pike (<i>Esox lucius</i>) and brown trout. The reservoir is hydrologically connected to the Site via a number of watercourses, however, considering the embedded and standard mitigation measures that would be employed (refer to Section 8.5) including a 50m buffer of infrastructure from watercourses, pollution prevention measures and water quality and biotic monitoring, pollution is unlikely to occur in concentrations sufficient to cause injury and/or mortality to fish. Moreover, the large volume of water within Carron Valley Reservoir is likely to dilute any pollutants beyond discernible effect, as such there is not considered to be a sufficient pathway for significant effects on fish within the reservoir.
Terrestrial and Aquatic Invertebrates	Whilst there are records of various terrestrial invertebrate species in the vicinity of the Site, most of the records relate to species which are relatively common and widespread. Current NatureScot guidance notes that there are some species, e.g. moths and other invertebrates, that with standard mitigation are unlikely to experience any significant environmental effects. Loss of suitable habitat for terrestrial invertebrates will be relatively small (Table 8-12) and large areas of suitable habitat will be retained. Moreover, embedded and standard mitigation measures (refer to Section 8.5) include a range of measures that will avoid or reduce potential effects on terrestrial invertebrate habitat. Significant effects on terrestrial invertebrates are therefore unlikely and detailed assessment is not required. Watercourses within the Site were considered to have poor habitat for aquatic invertebrate species and species of high biodiversity value are unlikely to be present. As such the Site is considered to have less than local value for aquatic invertebrates. In addition, embedded and standard mitigation measures (refer to Section 8.5), including 50m buffers from watercourses (with the exception of watercourse crossings) and pollution prevention measures would prevent deterioration of watercourse habitats. Macroinvertebrate species would also be monitored throughout pre-construction, construction and post-construction phases and remedial measures implemented in the unlikely event that potentially significant effects are identified. Based on the above, significant effects on terrestrial invertebrates are therefore unlikely and detailed assessment is not required.
Reptiles	Common lizard has been recorded incidentally and the Site is considered to have local value for the species. However, loss of suitable habitat for reptiles will be relatively small (see Table 8-12) and large areas of suitable habitat will be retained. Embedded and standard mitigation measures would be employed (refer to Section 8.5), including removal of potential refugia under the supervision of an ECoW to reduce the likelihood of accidental killing or injury to reptiles during the construction phase. On the basis of the above, significant effects on reptiles are unlikely and detailed assessment is not required.
Amphibians	eDNA surveys for GCN in two ponds within the Site did not identify the presence of the species. Common toad and common frog are both likely to be present at the Site, but the Site is considered to be of less than local value for them. As such, significant effects on amphibians are unlikely and detailed assessment is not required.



Important Ecological Features Scoped in

8.6.2 More detailed assessment of effects is required for IEFs considered to be of local or greater value that are known to be present within the Site or surrounding area (as confirmed through survey results and consultations) and are at risk of a significant effect as a result of the Proposed Development. These IEFs are summarised in **Table 8-11**.

Table 8-11: Important Ecological Features Scoped in For Detailed Assessment

Important Ecological Feature	Nature Conservation Value	Comments
Endrick Water SSSI/SAC	International	The Endrick Water SSSI and SAC are both located outwith the Site boundary but are hydrologically connected. At the closest point the SAC / SSSI is located 1.4km south west of the Site (straight line distance) and is hydrologically connected to the Site by a distance of 3.5km. The SSSI and SAC have overlapping boundaries until the lower reaches of the Endrick Water below Drymen, however, for the purposes of this assessment the two designated sites are considered in tandem and their qualifying interest features overlap. Despite the intervening distance, given the importance of the Endrick Water SAC/SSSI and its hydrological connection to the Site it has been scoped in for detailed assessment.
Habitats	Local - County	Two Annex I habitats were identified within the Survey Area: <i>Carex rostrata-Sphagnum recurvum</i> mire; and <i>Carex rostrata-Calliergon cuspidatum/giganteum</i> mire. A number of SBL listed habitats are present within the Site including upland acid grassland (g1b6), upland calcareous grassland (g2b), wet woodland (w1d), broadleaved woodland (w1g), upland heathland (h1b), degraded blanket bog (f1a6), upland flushes, fens and swamps (f2c), transition mires and quaking bogs (f2c8), standing open water (r1) and other rivers and streams (r2b). These habitats have been valued as having local to county level importance. All habitats identified as having local or greater value (Table 8-7) that could be directly or indirectly affected by the Proposed Development (see Table 8-12) have been scoped in for detailed assessment.
Bats (common pipistrelle, soprano pipistrelle and <i>Nyctalus</i> species)	Local	At least six species of bat were identified within the Site: common pipistrelle; soprano pipistrelle; Nathusius' pipistrelle; <i>Pipistrellus</i> species; <i>Myotis</i> species; <i>Nyctalus</i> species; and brown long-eared bat. Of these species four are considered to be of 'High' collision risk: common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, and <i>Nyctalus</i>. A single pass was attributed to Nathusius' pipistrelle throughout the entire survey period, as such they have been scoped out of assessment on the basis that significant populations do not reside within the vicinity of the Site. <i>Myotis</i> species, including Daubenton's bat and Natterer's bat are low flying and not a high collision risk so have been scoped out of detailed assessment. There were only 11 brown



Important Ecological Feature	Nature Conservation Value	Comments
		long-eared bat records and that species has therefore also been scoped out of detailed assessment. On the basis of the above, common pipistrelle, soprano pipistrelle and <i>Nyctalus</i> species have been scoped in for detailed assessment.

8.7 Assessment of Effects

- 8.7.1 This section provides an assessment of the likely effects of the Proposed Development on the IEFs scoped in for detailed assessment (see Section 8.6). The assessment of effects is based on the description of the Proposed Development as outlined in **Chapter 3: Description of the Development**. The assessment of construction effects is presented in Section 8.7.4 to 8.7.25, and the assessment of operational effects is provided in Section 8.7.26 to 8.7.55.
- 8.7.2 Decommissioning effects are scoped out of detailed consideration. During decommissioning of the Proposed Development, potential effects on IEFs would be expected to be similar in nature to those during the construction phase, but of lower magnitude as there would be no habitat loss. Assuming that similar embedded and standard mitigation measures would be employed and there has been no significant alteration in the environmental conditions at the Site, no significant effects are predicted for any IEF during decommissioning.
- 8.7.3 Prior to decommissioning, a Decommissioning Plan would be prepared and agreed with Stirling Council. The Decommissioning Plan would provide details of the decommissioning methodologies that would be adopted, mitigation measures that would be employed, emergency response procedures, methods for monitoring ecological effects and an indicative programme of works. The Decommissioning Plan would be informed by update ecological survey data and any new legislation or guidance would be incorporated within the Decommissioning Plan.

Construction Effects

Endrick Water SAC

- 8.7.4 The Endrick Water SAC lies 1.4km south west of the Site, at its closest point, and approximately 3.5km downstream of the sole connective tributary within the Site. The SAC also shares the same boundary as the Endrick Water SSSI in its upper reaches, and both designations are hereafter considered collectively. No migratory fish (Atlantic salmon or river lamprey) originating from the SAC are likely to be present in tributaries within the Site. One impassable natural barrier (waterfall) is present 3.5km downstream of the Site; it is considered this is the furthest extent migratory fish species can access on the mainstem of the Endrick Water.
- 8.7.5 There will be no direct loss of watercourse or riparian habitat associated with the Endrick Water SAC, which is located 1.4km from the Site. There will be minimal losses of riparian habitat within the Site boundary to accommodate the widening of existing access tracks. Habitat loss is primarily commercial conifer plantation and would not occur on connective tributaries of the Endrick Water SAC.
- 8.7.6 Construction activities hold the potential to result in a deterioration of water quality where activities occur in close proximity to watercourses. Water quality parameters typically affected include suspended solids/turbidity, reduced dissolved oxygen, pH,



temperature, toxic chemicals, spillage of fuel or other contaminants. Additionally, any felling works to clear areas for infrastructure or widening existing tracks has the potential to mobilise nitrogen and phosphorous compounds (e.g. NO_3 and PO_4) which may persist after construction. The Endrick Water mainstem would not be directly affected by potential water quality deterioration as this lies fully outwith the Site. The connective tributary running across the northern Site boundary has the potential to mobilise pollutants carrying these downstream into the SAC, however, it is approximately 200m from the nearest proposed infrastructure (an existing forestry access track) and is therefore unlikely to experience significant run-off.

- 8.7.7 Five tributaries are present within the southern areas of the Site and feed into the Carron Valley Reservoir. The reservoir has two outlets, one of which feeds into the mainstem of the Endrick Water, approximately 1.8km above the SAC, and the other into the River Carron (River Forth Catchment). Considering the volume of water within the reservoir, it is likely that any pollution generated would be diluted beyond discernible effect.
- 8.7.8 In addition to the above, the embedded and standard mitigation measures that would be employed (refer to Section 8.5), including a 50m buffer of infrastructure from watercourses, pollution prevention measures and water quality and biotic monitoring, would further reduce the risk of downstream pollution incidents affecting the qualifying interests of the Endrick Water SAC / SSSI.
- 8.7.9 Based on the above, there is no realistic pathway for connectivity to aquatic features of the SAC, which includes Atlantic salmon and lamprey sp. and as such **no significant effects** are likely.

Habitats

- 8.7.10 The Proposed Development would result in permanent habitat loss due to land take associated with the construction of wind turbine foundations, hardstanding laydown areas, and access tracks. Indirect and temporary loss or damage may also occur during construction in areas close to the Proposed Development infrastructure.
- 8.7.11 **Table 8-12** presents a comprehensive list of the areas of direct and indirect / temporary habitat loss for all habitat types within the Site (regardless of importance):
- Direct habitat loss – this includes habitats present within the footprint of the Proposed Development. This includes all areas of tree cover to be felled, including areas felled to create the 50m buffer between blade tips and woodland edges for bats. Where existing forestry tracks will be used as part of the Proposed Development, direct losses have not been presented in **Table 8-12**, however, all proposed widening of tracks, plus a 3m buffer on either side of the proposed widened track to account for losses associated with the burying of a cables has been included in the habitat loss calculations.
 - Indirect/temporary habitat loss or damage - this includes areas within the Site boundary that would be disturbed / damaged during construction, and reinstated following construction, where feasible. A 5m buffer has been applied to infrastructure in line with similar assessments for other projects, and, although arbitrary, is considered precautionary. Some small areas classed as degraded blanket bog (f1a6) are present within forest rides but have been degraded too far to fit an NVC category. Such habitats also have existing drains within 5m of the habitat and lie on shallow peat. Peatland habitats can be subject to possible drying effects and associated change, with such effects potentially occurring for a distance of up to 30m of infrastructure (NatureScot, 2026). However, in this case, given the degraded and modified nature of the



habitat, significant drying effects are considered unlikely to occur beyond the 5m buffer applied for other habitat types.

- 8.7.12 In the absence of mitigation, there is also potential for temporary, indirect adverse effects to habitats associated with wet substrates resulting from diffuse pollution or sedimentation events. However, through implementation of the proposed embedded and standard mitigation measures outlined in Section 8.5, the magnitude of any impact is considered likely to be low and the resulting effect **not significant**.
- 8.7.13 Built linear structure (u1e) losses have not been included in the **Table 8-12** summary. Losses are associated with overlap of existing access tracks with the proposed access tracks and do not present true losses; the habitat is considered to be of less than local value.

Table 8-12: Habitat Losses

UKHab	NVC Community	NVC mosaics	Direct Loss (ha)	Indirect Loss (ha)	Total Loss (ha)	Habitat Importance
f2f Other wetlands	M23b	OV27b, U4b, M6c, M9b, MG9a	0.40	0.35	0.75	Local
g1b6 Other upland acid grassland	U4a/b	M23b	0.04	0.07	0.11	Less than Local
g3c Other neutral grassland	OV27a/b/c	U4b, M23b, MG9a	0.30	0.25	0.55	Less than Local
g3c Other neutral grassland	NA	NA	0.01	0.01	0.02	Less than Local
s1d Other inland rock	NA	NA	0.22	0.06	0.28	County
w1d Wet woodland	W4c	W7c	0.02	0.00	0.02	Local
w1d Wet woodland	W6a	NA	0.05	0.01	0.06	Local
w1d Wet woodland	W7c	NA	0.10	0.02	0.12	Local
w1h Other woodland; mixed	NA	NA	0.01	0.00	0.01	Local
w1h6 Other woodland; mixed; mainly conifer	NA	NA	3.56	0.26	3.82	Less than Local
w2c Other coniferous woodland	NA	NA	33.44	2.12	35.56	Less than Local
Total Loss			38.15	3.15	41.30	



- 8.7.14 An assessment of the significance of effects on each habitat / vegetation community as a result of the anticipated habitat loss or damage is detailed below for habitats of local value or greater.
- 8.7.15 For some habitats considered to be of local value, significance of the predicted loss was considered to be **not significant** due to the small extent of the predicted losses (<1.0 Ha); these are listed below:
- f2f Other Wetlands (0.75 Ha);
 - w1d Wet woodland (0.20 Ha); and
 - w1h Other woodland; mixed (0.01 Ha).
- 8.7.16 All watercourse crossings are upgrades of existing crossings, no new crossings are proposed. As such no loss of watercourse habitat is anticipated and assuming that the proposed embedded and standard pollution prevention measures (see Section 8.5) are adopted, **no significant effect** is predicted on the running water environment.

Other Inland Rock (s1d)

- 8.7.17 A direct habitat loss of 0.22ha and indirect loss of 0.06ha would occur as a result of the Proposed Development (total loss 0.28ha). Losses are restricted to the quarry in the east of the Site where several rare or scarce plant species including shepherd's cress, small cudweed and annual knawel are known to occur. Plants are unique to the sparse rocky habitat created by the quarry and unlikely to have occurred within the Site prior to the creation of the quarry or access tracks. The precise species distribution is unknown within the quarry as vegetation surveys focused on broad habitat types rather than detailed species-specific surveys. Under a worst-case scenario it is assumed that loss of plant species would occur during the construction phase as a result of the movement of rocks and damage from vehicle movements. Indirect effects may also occur, e.g. through vehicles parking in undesignated locations or through localised dust production. The proposed embedded and standard mitigation measures, as outlined in Section 8.5, include the marking out of rare and protected species by the ECoW and the instigation of measures to avoid indirect effects where possible, however, where these lie within the infrastructure footprint plants would be lost.
- 8.7.18 Distribution within the UK of all three species is widespread⁹, including within the Stirling Council area and wider central belt, but is largely limited to discrete areas of inland rock. For shepherd's cress and annual knawel, multiple records exist within the Site, although concentrated within the quarry and on the access track. As such it is likely that plants would re-colonise during the operational phase when the quarry is no longer in operation. Records of small cudweed exist within the wider landscape, approximately 8km away, as such re-colonisation may be slower.
- 8.7.19 Overall, considering the species are present within the Site and wider landscape, and are widely distributed throughout the UK and more locally, the potential loss or damage of individuals after embedded mitigation is considered to be **not significant**.

Bats

Roosting

- 8.7.20 Three trees were identified during the DBW that were subsequently subject to a full GLTA. All three trees were given a GLTA assessment of 'NONE' (i.e. no roost potential). None of these trees are located within 30m of any proposed infrastructure



- and they would not be felled. As such, based on current data, no destruction of roosts or disturbance of bats occupying roosts would occur as a result of the Proposed Development and therefore **no significant effect** on roosting bats is predicted.
- 8.7.21 It is generally considered that coniferous woodland is of low value to roosting bats, due to the dense branching preventing access to any potential roost features, especially where the woodland is un-thinned and located in upland locations. As such, loss of coniferous woodland to facilitate the Proposed Development is not considered to significantly change the availability of potentially suitable roosting habitat across the Site. Natterer's bats have been found to roost in coniferous woodlands^{37,38}, however, this is largely limited to native Scots pine woodlands which are more open/less dense than spruce woodlands. Alternative research has also indicated avoidance of dense conifer plantations by Natterer's³⁹. Brown-long eared bat exhibit tendencies to forage along the edges of conifer plantations³⁹, while common and soprano pipistrelle use conifer woodland and may roost in trees over summer³⁹.
- 8.7.22 Under the proposed embedded and standard mitigation measures, pre-construction surveys for bat roosts of the forestry areas identified for felling will be conducted in order to update baseline survey data and to determine any changes in activity at the trees previously subject to a GLTA. The results of the pre-construction surveys would also determine the need for a bat-specific SPP.

Commuting and Foraging

- 8.7.23 There is the potential for temporary disturbance and / or displacement of commuting and foraging bats as a result of increased noise and artificial lighting during hours of darkness during the construction phase. However, as construction works would be carried out primarily during daylight hours (with appropriate mitigation applied in the case that night-time working was required – see Section 8.5), significant disturbance to foraging or commuting bats during their active hours is considered unlikely. The areas affected are also relatively small in the context of the Site as a whole and alternative commuting and foraging habitat is widely available.
- 8.7.24 Keyhole felling and felling of inner sections of conifer woodland to facilitate the new section of access track to T1, is predicted to increase the length of commuting and foraging habitat available to bats during and after the construction phase. Over time, as ground vegetation establishes the prey resource of these areas will also increase for bats providing increased foraging opportunities.
- 8.7.25 Based on the above, **no significant effects** on commuting and foraging bats are predicted during the construction phase.

³⁷ Bat Conservation Trust. (2018). Bats & Trees. Bat Conservation Trust, London. [Online] Available at: https://cdn.bats.org.uk/uploads/pdf/Bats-Trees.pdf?v=1541085197&_gl=1*js6nmw*_ga*MTIwNDc4MzM3Ny4xNzI4MDQ2MjEy*_ga_G28378TB9V*MTczMDQyNzA0OC44LjAuMTczMDQyNzA0OC4wLjAuMA

³⁸ FCS. (2009). FCS Guidance Note 35a: Forest Operations and Bats in Scotland. Forestry Commission Scotland. [Online] Available at: <https://www.forestry.gov.scot/publications/33-forest-operations-and-bats-in-scotland/viewdocument/33>

³⁹ Smith, P.G. & Racey, P.A. (2008). *Natterer's bats prefer foraging in broad-leaved woodlands and river corridors*. Journal of Zoology, 275, 3, 314-322. [Online] Available at: <https://zslpublications.onlinelibrary.wiley.com/doi/abs/10.1111/j.1469-7998.2008.00445.x>



Operational Effects

Endrick Water SAC / SSSI

- 8.7.26 During operation of the Proposed Development, in the absence of mitigation, effects on the qualifying interests of Endrick Water SAC / SSSI could potentially arise from environmental incidents and accidents (e.g. spillages) into freshwater habitats with hydrological connectivity with the SAC / SSSI. However, as described in relation to construction, following the implementation of proposed embedded and standard mitigation measures (refer to Section 8.5) there is no realistic pathway for connectivity to aquatic features of the SAC. Furthermore, operational maintenance is considered to be low in frequency and disturbance, meaning the likelihood of an effect on the SAC / SSSI qualifying interests is lower than during the construction phase. Based on the above, no significant effects are considered likely on the qualifying interests for Endrick Water SAC during the operational phase.

Habitats

- 8.7.27 During the operational phase, no adverse impacts on retained habitats and plant species are predicted. Infrastructure would be in place and any vehicle movement on Site would be limited to constructed access tracks. The potential for incidents and spillages affecting important habitats is considered to be very low. In addition to this, standard good practice measures would be implemented further reducing the risk of an incident occurring. Therefore, the effect on retained habitats during operation would be negligible and not significant.

Bats

- 8.7.28 Potential risks presented to commuting and foraging bats during the operational phase of the Proposed Development include:
- Direct collision with operational turbine blades, resulting in injury or mortality; and
 - Barotrauma (whereby sudden changes in air pressure around moving wind turbine blades results in internal haemorrhaging of the lungs, leading to serious injury and/or mortality).
- 8.7.29 Details of the proposed aviation lighting scheme for the wind turbines are provided in **Technical Appendix 14.1** and include the use of infrared and visible red lights on the wind turbines, during the hours of darkness, with light intensity to be dimmed to 10 % of their peak intensity when visibility exceeds 5km. Aviation lighting has the potential to affect bats' insect prey species and therefore increase bat activity in the vicinity of the turbines. Some migrating bat species may also be directly attracted to light sources (Bat Conservation Trust and Institution of Lighting Professionals, 2023)⁴⁰.
- 8.7.30 There is a relative lack of information available on the effects of turbine lighting on bats within Europe, although studies have been conducted in the USA. A five-year study undertaken in Texas (Bennett & Hale, 2014)⁴¹ found that there was no significant difference between bat fatalities at turbines with lights and those without lights, although their study was based on turbines with flashing red lights (CAA

⁴⁰ The Bat Conservation Trust and Institution of Lighting Professionals (2023) Guidance Note 08/18: Bats and artificial lighting in the UK, Bats and the Built Environment series.

⁴¹ Bennett, V. J and Hale, A. M. (2014) Red aviation lights on wind turbines do not increase bat-turbine collisions. *Animal Conservation* 17 p.354-358.



guidelines require lights in the UK to be non-flashing). Arnett *et al.* (2008)⁴² reviewed findings from 21 post-construction monitoring studies in the USA and Canada and also found no significant difference between bat fatalities with aviation lighting and those without lights. Importantly, one of the studies included in their review found no significant difference in bat fatality between turbines with flashing red beacons and turbines with steady glowing red beacons. In addition, Bruce-White and Shardlow (2011)⁴³ state that in general insects are most strongly attracted to UV light and are least attracted to red lights. In conclusion, the published evidence points to the fact that infrared and visible red aviation lighting is unlikely to lead to increased bat fatalities compared with unlit turbines and effects on bats resulting from aviation lighting are likely to be **not significant**.

8.7.31 In accordance with guidance outlined in NatureScot (2021), bat activity data confirmed the regular presence of three species of bat classified as 'high risk' of collision with wind turbines utilise the Site:

- Common pipistrelle;
- Soprano pipistrelle; and
- *Nyctalus* Species.

8.7.32 The specific risks to each species/species group are described below.

Common pipistrelle

8.7.33 The collision analysis presented in **Technical Appendix 8.4: Bat Survey** indicates that during typical activity levels the risk of collision was Medium for the Site overall, increasing to High during periods of peak activity. This was calculated on the basis of a moderate habitat risk and large project size (see **Technical Appendix 8.4** for further details). Categorisation as 'medium project' was used on a precautionary basis to account for wind turbine height >100m despite the number of wind turbines being significantly below the N=40 threshold⁶.

8.7.34 The majority of activity for common pipistrelles was located around Statics A and E. Pass rates were considered to be low at Static B, F and H, with activity recorded primarily within the summer deployment period. Static F was located on the Cairnoch Hill plateau which was initially categorised as having high foraging potential, however, the total pass rate was very low at 23 passes over the entire 2024 survey season (Refer to **Technical Appendix 8.4** for further information). It is therefore considered likely that forestry rides and drainage features/watercourses provide the highest quality commuting and foraging routes within the Site. During the operational period interior areas of conifer forestry will be opened via felling for access tracks and infrastructure providing increases in the suitable foraging and commuting habitat within the Site. However, all turbines will be located at least 50m from woodland edge habitat (as measured from blade tips) in accordance with standard NatureScot *et al.* (2021) guidance which would reduce the likelihood of bats using woodland edges for foraging and commuting coming into close proximity to the turbines. The proposed embedded and standard mitigation measures also include feathering of blades while wind turbines are idling (see Section 8.5).

⁴² Arnett, E., Brown, W. K., Erickson, W. P., Fiedler, J. K., Hamilton, B. L., Henry, T. H., Jain, A., Johnson, G. D., Kerns, J., Koford, R. R., Nicholson, C. P., O'Connell, T. J., Piorkowski, M. D. and Tankersley, R. D. (2008) Patterns of Bat Fatalities at Wind Energy Facilities in North America. *The Journal of Wildlife Management* 72(1), p.61-78.

⁴³ Bruce-White, C. and Shardlow, M. (2011) A review of the impact of artificial light on invertebrates. Buglife – The Invertebrate Conservation Trust.



- 8.7.35 Common pipistrelle is considered to be common within the Site and wider landscape, as such any adverse effects on the species are unlikely to be detrimental to their population status within the Site and local area.
- 8.7.36 The above notwithstanding, there is some uncertainty as to the potential effect that the Proposed Development could have on local common pipistrelle populations. This is due to uncertainty over the actual level of mortality that is likely to occur, the lack of a detailed understanding of the size of local common pipistrelle populations and the possibility that bat activity levels could change post-construction, in response to habitat changes following tree felling and potentially attraction to turbines.
- 8.7.37 A precautionary approach has therefore been applied in this assessment, which assumes that in the absence of additional mitigation, the operational wind farm could potentially result in killing or injury to common pipistrelle to the extent that it could possibly negatively affect the conservation status of local populations. If that occurred, it would represent a **significant negative effect at a local level**.

Soprano pipistrelle

- 8.7.38 The collision analysis presented in **Technical Appendix 8.4** indicates that during both typical and peak activity levels the risk of collision was High throughout the Site. This was calculated on the basis of a moderate habitat risk and large project size. Categorisation as 'large project' was used on a precautionary basis as for common pipistrelle.
- 8.7.39 Soprano pipistrelle activity was highest at Statics A, B, E and G, with highest activity levels all within the summer survey season. Very low levels of activity were associated with Statics F and H. As with common pipistrelle, activity was largely associated with the presence of linear habitats (e.g. drainage and forestry edge habitat) and not the open habitats such as the peatland on top of Cairnoch Hill. As above, the embedded and standard mitigation measures include a design commitment that all wind turbines will be located at least 50m from woodland edge habitat (as measured from blade tips), which would reduce the likelihood of bats using woodland edges for foraging and commuting coming into close proximity to the wind turbines. The proposed embedded and standard mitigation measures also include feathering of blades while turbines are idling.
- 8.7.40 Soprano pipistrelle is considered to be common within the Site and wider landscape, as such adverse effects on the species are unlikely to be detrimental to their population status within the Site and local area.
- 8.7.41 As for common pipistrelle, there is some uncertainty as to the potential effect that the Proposed Development could have on local soprano pipistrelle populations, for similar reasons to those described above for common pipistrelle. A precautionary approach has therefore been applied, which assumes that in the absence of additional mitigation, the operational wind farm could potentially result in killing or injury to soprano pipistrelle to the extent that it could possibly negatively affect the conservation status of local populations. If that occurred, it would represent a **significant negative effect at a local level**.

Nyctalus Species

- 8.7.42 A total of eight passes was recorded for *Nyctalus* throughout the entire survey season at Statics A, C, D and F. Even assessing the collision risk on a precautionary basis, the Site was considered to be of low risk during typical levels of activity, remaining low during periods of peak activity. Considering the embedded and standard mitigation measures employed, including the minimum buffer distances



between blade tip and woodland edge and feathering of turbines while idling, it is considered unlikely that collisions would occur at a level likely to result in a significant negative effect on local *Nyctalus* populations.

Additional Mitigation, Compensation and Enhancement

Bat Monitoring and Additional Mitigation (if required)

- 8.7.43 As highlighted in Section 8.7.41, there is some uncertainty as to the potential effect that the Proposed Development could have on local common and soprano pipistrelle populations. Post-construction bat monitoring is therefore proposed to determine with certainty whether or not significant effects are likely.
- 8.7.44 The proposed monitoring strategy has been broken down into three phases:
- Phase 1 – Updated baseline monitoring of bat activity, prior to wind farm operation.
 - Phase 2 – Monitoring of bat activity during wind farm operation, to initially be undertaken in years one to three post construction.
 - Phase 3 – Collision monitoring, which would only be enacted if required, based on the results of post-construction bat activity monitoring.
- 8.7.45 Phase 1 would aim to establish an updated baseline against which to assess any future changes in bat activity post-construction. Baseline monitoring would take place in accordance with current NatureScot *et al.* guidelines and would involve the use of static bat detectors, stationed at ground level at each turbine location. Recording would take place at each turbine location over a minimum 10-night period in each of spring, summer and autumn.
- 8.7.46 Post-construction bat activity monitoring would start in year one of wind farm operation and would take place annually for the first three years of operation. The need for further monitoring would be reviewed at the end of year three. Post-construction bat activity monitoring would involve collection of bat activity data at ground-level, at the same locations, using the same methods and over similar timescales as the baseline monitoring undertaken during Phase 1.
- 8.7.47 Phase 3 would only be implemented if Phase 2 indicates that the Proposed Development could potentially be having a significant effect on bats, for example if increases in activity of bat species at high risk of collision are identified compared with baseline monitoring data or if bat corpses are found incidentally. If required, collision monitoring would be specifically targeted at areas where potentially significant effects are most likely (as identified during bat activity monitoring).
- 8.7.48 Monitoring to detect bat carcasses, in sample locations across the Site, using specially trained search dogs is widely accepted to be the most effective way of detecting casualties (Mathews *et al.*, 2013⁴⁴; NatureScot *et al.*, 2021) at this time. However, due to the rapidity with which technology is progressing, it is possible that new, more effective methods for monitoring collision risk will emerge in the meantime. The precise methodology to be used, if collision monitoring is required, would therefore be determined nearer the time.
- 8.7.49 In the event that collision monitoring identified potentially significant effects on pipistrelle bats, the results of the monitoring would be used to inform the

⁴⁴ Matthews, F., Swindells, M., Goodhead, R., August, T. A., Hardmann, P., Linton, D. M. and Hosken, D. J. (2013) Effectiveness of search dogs compared with human observers in locating bat carcasses at wind-turbine sites: A blinded randomized trial. Wind Energy and Wildlife Conservation. Wildlife Society Bulletin.



development of additional mitigation proposals (such as curtailment of specific turbines during high-risk periods⁴⁵, or other methods considered to represent best practice at that time).

- 8.7.50 Further details would be provided in a Bat Monitoring and Mitigation Strategy (BMSS) to be produced and agreed with Stirling Council post consent.

Outline Habitat Management Plan

- 8.7.51 An Outline HMP is provided in **Technical Appendix 8.6**. The Outline HMP would be worked into a final, detailed HMP, post-consent and subject to agreement with Stirling Council and other relevant stakeholders (which may include NatureScot, SEPA, FLS, etc.).

- 8.7.52 The broad aim of the Outline HMP is to describe the proposed habitat restoration and management measures to be undertaken over the lifetime of the Proposed Development. It details the habitat management and monitoring that is proposed to compensate for the direct and indirect loss of semi-natural habitats as a result of construction of the Proposed Development and to provide substantial biodiversity enhancements, in accordance with NPF4. Enhancement measures are also proposed for features of conservation value that may not be negatively affected by the Proposed Development but where opportunities for improvement to habitats exist.

- 8.7.53 The measures outlined in the Outline HMP include:

- Planting areas of broadleaf woodland amounting to 15.46ha and 11.83ha of riparian woodland, and managing a further 8.81ha of wet woodland to maintain broadleaf woodland free of conifer regeneration – this would represent a substantial biodiversity enhancement given most of the woodland which would be lost is non-native coniferous plantation;
- Restoring an area of 13.71ha of peatland through increasing the water table and maintaining the peatland restoration area free of conifer regeneration – no direct or indirect loss of bog habitat would occur due to the Proposed Development and therefore the proposed peatland restoration would represent an enhancement;
- Creating and improving pond habitats within the Site – this would represent an enhancement given no pond habitats would be adversely affected by the Proposed Development;
- Providing bat and bird boxes and an osprey platform (see also **Chapter 9: Ornithology**) to provide compensatory roosting / nesting habitat in response to the loss of conifer plantation. This could also be considered as enhancement due to the poor-quality roosting / nesting habitat currently provided by the conifer plantation; and
- Removal of giant hogweed adjacent to the Site boundary.

- 8.7.54 Compensation and enhancement measures provided as part of the Outline HMP would remain in place throughout the operational phase.

⁴⁵ Current NatureScot *et al.* guidelines endorse curtailment but recommend that curtailment is restricted to times and weather conditions when bats are at high risk of collision. In order to minimise down time, the guidelines note that site-specific threshold values at which turbine curtailment is employed should be determined, informed by bat activity at that location. They go on to state that as an indication, curtailment thresholds are likely to be in the range of wind speeds between 5.0 and 6.5 m/s, as measured at the nacelle and at temperatures above approximately 10 or 11°C.



Residual Effects

8.7.55 Following the implementation of the proposed bat monitoring and additional mitigation (if required), and the implementation of the HMP, **no significant residual effects** are predicted.

Cumulative Assessment

8.7.56 As set out in Section 8.3.52-56, for this assessment potential cumulative effects have been assessed for the following features and developments:

- Cumulative effects on terrestrial ecological features within 2km of the Site;
- Cumulative effects on aquatic features within the same hydrological sub-catchments (and within 10km); and
- Cumulative effects on bat populations, which are possible in combination with other wind farms within an 8km radius of the Proposed Development (based on two times 4km, which is taken to be the maximum CSZ radius for the relevant bat species⁴⁶).

8.7.57 Projects considered for cumulative effects are listed in **Table 8-13**, including whether they have been scoped into the cumulative effects assessment.

Table 8-13: Other projects Considered in Cumulative Effects Assessment

Project	Status	Distance from Site (km)	River Sub-Catchment (Catchment)	Reason for Scoping in/out of cumulative assessment
Considered in Cumulative Assessment				
Earlsburn Wind Farm	Operational	520m N	Endrick Water (River Leven Catchment)	Hydrological connection, within 2km
Shelloch Wind Farm	Consented	1.6km NW	Endrick Water (River Leven Catchment)	Hydrological connection, within 2km
Earlsburn North (Kingsburn) Wind Farm	Operational	2.5km N	Endrick Water (River Leven Catchment)	Hydrological connection, within 8km (bats) and 10km (aquatic features)
Drummarnock Wind Farm	In Planning	1km NE	River Carron (River Forth Catchment)	Within 2km
Not Considered in Cumulative Assessment				
Craigannet Turbine	Operational	190m E	River Carron (River Forth Catchment)	No hydrological connection. No effects likely on habitats or terrestrial fauna as project is operational. No data for bats identified in search.
Craigengelt Wind Farm	Operational	480m NE	River Carron (River Forth Catchment)	No hydrological connection. No effects likely on habitats or terrestrial fauna as project is operational.

⁴⁶ Bat Conservation Trust. (2016). Core Sustainance Zones: Determining zone size. [Online] Available: [Core Sustainance Zones Explained 04.02.16.pdf](#)



Project	Status	Distance from Site (km)	River Sub-Catchment (Catchment)	Reason for Scoping in/out of cumulative assessment
				No data for bats identified in search.
Earlsburn Extension Wind Farm	Consented	2.7km N	Endrick Water (River Leven Catchment) and River Forth	No hydrological connection and beyond 2km. No data for bats identified in search.

8.7.58 The conclusions of the cumulative assessment for each of the other developments considered within the assessment are provided in **Table 8-14**. The list of IEFs for which cumulative effects assessment is possible was compiled based on the IEFs assessed in the relevant project's EIA documentation.



Table 8-14: Cumulative effects Assessment

Project Name / Distance from Site (km)	Status	IEFs for which cumulative effects are possible	Assessment Details for Relevant Features (Residual Effects)
Earlsburn Wind Farm 520m N	Operational	Habitats Bats Otter Badger Pine marten Fish (brown trout) Water Quality Endrick Water SAC	Earlsburn Wind Farm is located wholly within the Endrick Water catchment. It is located on Cringate Law Hill with watercourses draining directly into the upper reaches of the Endrick Water. The furthest downstream point on the Endrick Water potentially at risk of surface run-off from turbines is approximately 4.35km upstream of the SAC and 1.65km upstream of the closest confluence with tributaries originating within the Site. Similar to the Proposed Development it is assumed that migratory fish, including species representing qualifying interests for Endrick Water SAC and SSSI, will be unable to access the site given the presence of downstream impassable barriers. Given the Site has been operational for 19 years (2007), it is considered that any pollution generated during the construction phase (both water and airborne) would have dissipated beyond detectable limits. Therefore, there is a negligible pathway for cumulative effect on water quality within the Endrick Water SAC. Due to works and presence being limited during the operational phase to ad hoc visits by maintenance vehicles, there is not considered to be a sufficient pathway for a cumulative disturbance effect on protected or notable species within the Site. No data are available for bats for Earlsburn Wind Farm and therefore a meaningful assessment of cumulative effects on bats is not possible. Based on the above, no significant cumulative effects are likely.
Shelloch Wind Farm 1.6km NW	Consented	Water Quality Endrick Water SAC Fish (Brown trout) Otter Bats	Shelloch Wind Farm is located wholly within the Endrick Water catchment. It has a number of unnamed watercourses draining into the Backside Burn, a major tributary in the Endrick Water catchment. The furthest downstream point on the Endrick Water potentially at risk of surface run-off from turbines is approximately 4.8km upstream of the SAC and 2.1km upstream of the closest confluence with tributaries originating within the Site. Similar to the Proposed Development it is assumed that migratory fish, including species representing qualifying interests for Endrick Water SAC and SSSI, will be unable to access the Site given the presence of downstream impassable barriers.



			The construction period is predicted to last 12 months⁴⁷, however, no start/end date is provided in the project description documentation so it can't be ruled out that construction could coincide with construction of the Proposed Development. Given the distances upstream and the location of infrastructure cited away from tributaries of the Backside Burn, it is considered that any pollution generated during the construction phase would have dissipated beyond detectable limits before reaching the Endrick Water. Moreover, considering the pollution prevention measures proposed in the EIA Report, occurrence of prolonged or significant pollution events is considered unlikely. Therefore, there is a limited pathway for cumulative effect on water quality within the Endrick Water SAC. Surveys identified the presence of badger and otter, although no significant effects were predicted for either species and given the intervening distance cumulative effects on these species are unlikely. Three bat species were recorded within the site during surveys, with soprano pipistrelle and common pipistrelle comprising the only high collision risk species recorded and bats were scoped out of detailed assessment. No significant effects on bats were predicted and insufficient data are provided to enable a meaningful assessment of cumulative effects on bats to be undertaken. Based on the above, no significant cumulative effects are likely.
Earlsburn North (Kingsburn) Wind Farm 2.5km N	Operational	Water Quality Endrick Water SAC Fish (Brown trout) Otter	Earlsburn North (Kingsburn) Wind Farm is located wholly within the Endrick Water catchment. The Wind Farm has a number of unnamed watercourses draining into the Backside Burn (adjacent to Shelloch Wind Farm), a major tributary in the Endrick Water catchment. The furthest downstream point on the Endrick Water potentially at risk of surface run-off from turbines is approximately 4.8km upstream of the SAC and 2.1km upstream of the closest confluence with tributaries originating within the Site. Similar to the Proposed Development it is assumed that migratory fish, including species representing qualifying interests for Endrick Water SAC and SSSI, will be unable to access the Site given the presence of downstream impassable barriers. Given the site has been operational for 10 years (2016), it is considered that any pollution generated during the construction phase (both water and airborne) would have dissipated beyond detectable limits. Therefore, there is a negligible pathway for cumulative effect on water quality within the Endrick Water SAC. Due to works and presence within the site being limited during the operational phase to ad hoc visits by maintenance vehicles, there is not considered to be a sufficient pathway for in-combination effect.

⁴⁷ LUC. (2020). Shelloch Wind Farm EIA Report Chapter 4: Scheme Development. [Online] Available at: [20_00840_FUL-CHAPTER 4_SCHEME DESCRIPTION-792927.pdf](#)



			No data are available for bats for Earlsburn North (Kingsburn) Wind Farm and therefore a meaningful assessment of cumulative effects on bats is not possible. Based on the above, no significant cumulative effects are likely.
Drummarnock Wind Farm 1km NE	In Planning	Water Quality Endrick Water SAC Fish (Brown trout) Otter	Drummarnock Wind Farm is located within the River Forth catchment, as such there is no risk of cumulative effects on the Endrick Water SAC and SSSI. No terrestrial protected species were recorded during surveys for the Drummarnock EIA and therefore no significant cumulative effects on protected species are likely. With respect to bats, the Drummarnock Wind Farm EIA Report states that given the low quality of foraging and roosting habitats for bats it is unlikely that collision risk will be a substantial issue. It goes on to state that the risk of turbine mortality for common and soprano pipistrelle species is considered medium, but when considered at the population level the risk of significant mortality is low and no significant effects are predicted. It is not possible to undertake a detailed cumulative assessment for bats based on the data provided. Based on the above, no significant cumulative effects are likely.



8.8 Summary and Statement of Significance

- 8.8.1 **Table 8-15** provides a summary of the assessment for each of the IEFs scoped in for detailed assessment. Due to the design mitigation and further mitigation/monitoring no significant effects are predicted for any other ecological features. The Ecological Impact Assessment is therefore concluded with a finding of no significant adverse impacts in terms of the EIA Regulations should the Proposed Development proceed.



Table 8-15: Summary Table

Description of Effect	Mitigation / Compensation / Enhancement Measure(s)	Significance of Residual Effect	
		Level and Significance	Beneficial / Adverse
Potential effects on the qualifying interests of Endrick Water SAC / SSSI (Atlantic salmon and lamprey sp.) during construction and operation	Good practice techniques and a robust sedimentation strategy, details to be provided in a PPP and EIRP, which will form an integral part of the CEMP. Use of existing watercourse crossings (no new crossings). Electrofishing, macroinvertebrate and water quality monitoring programme.	Not Significant	Adverse
Direct and indirect habitat loss or damage to habitats of local or greater value during construction: Inland rock (loss of 0.28ha) Other wetland (loss of 0.75ha) Wet woodland (loss of 0.21ha) Other woodland (mixed, mainly conifer) (loss of 0.01ha)	Good practice measures to protect retained habitats, to be overseen by an ECoW. Implementation of an HMP for the duration of the operational phase, including the following measures: Broadleaf woodland planting over 15.46ha, plus 11.83ha of riparian woodland, and management of a further 8.81ha of wet woodland; Peatland restoration over an area of 13.71ha; Creation and improvement of pond habitats; Bat boxes; and Removal of giant hogweed.	Not Significant	Adverse but offset by implementation of the HMP which would also provide substantial enhancement
Potential effects on bats (disturbance, loss of foraging/commuting habitat, loss of potential roosting features, barrier effects from lighting) during construction	Pre-works checks for roosts prior to felling. Sensitive lighting scheme.	Not Significant	Adverse
Potential effects on bats (collision risk / barotrauma) during operation	Implementation of bat buffers around turbines. Feathering of turbines while idling. Post-construction bat monitoring and additional mitigation (if required).	Not Significant	Adverse



Description of Effect	Mitigation / Compensation / Enhancement Measure(s)	Significance of Residual Effect	
		Level and Significance	Beneficial / Adverse
Cumulative Effects			
No significant cumulative effects are anticipated as a result of the Proposed Development.			



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8.10 Abbreviations List

Abbreviation	Meaning
AIL	Abnormal Indivisible Load
AILV	Abnormal Indivisible Load Vehicle
BT	British Telecom
CEMP	Construction Environmental Management Plan
CNI	Critical National Infrastructure
CO ₂	Carbon Dioxide
DECC	Department of Energy and Climate Change
DESNZ	Department for Energy Security and Net Zero
DTM	Digital Terrain Model
EE	Everything Everywhere
EIA	Environmental Impact Assessment
ES	Emergency Services
FLS	Forestry and Land Scotland
HMP	Habitat Management Plan
JRC	Joint Radio Company
MBNL	Mobile Broadband Network Limited
MW	Megawatt
NPF4	National Planning Framework 4
OS	Ordnance Survey



Abbreviation	Meaning
PPS 18	Planning Policy Statement 18
SIS	Spectrum Information System
SLR	SLR Consulting Limited
SPMP	Soils and Peat Management Plan
UK	United Kingdom



Making Sustainability Happen



Chapter 9: Ornithology

Environmental Impact Assessment Report

Cairnoch Hill Wind Farm

3 August 2026



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Revision	Prepared By	Checked By	Approved By	Description
01	M.D./B.G./E.U.	M.R.	M.R.	-



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9.0 Ornithology

9.1 Introduction

- 9.1.1 This chapter has been prepared by APEM Ltd to examine the potential effects of the Proposed Development may have on the ornithological interests present at the location of the Proposed Development (“the Site”) and surrounding area, including Important Ornithological Features (IOFs). This assessment considers the potential effects with regard to each phase of the Proposed Development: the construction phase and operational phase. Appropriate mitigation measures are described to avoid or reduce potential negative effect(s). The mitigation measures detailed within this chapter should be read in conjunction with mitigation measures contained in **Technical Appendix 8.6: Outline Habitat Management Plan** and those contained in **Chapter 8: Ecology**.
- 9.1.2 This chapter of the Environmental Impact Assessment (EIA) Report is supported by the following Technical Appendices:
- **Technical Appendix 9.1: Year 1&2 Baseline Ornithology Reports;**
 - **Technical Appendix 9.2: Confidential Annex;**
 - **Technical Appendix 9.3: Collision Risk Modelling Report; and**
 - **Technical Appendix 9.4 Additional Confidential Annex.**
- 9.1.3 The Proposed Development refers to all elements of the application for the construction, operation of the Cairnoch Hill Wind Farm (**Chapter 3: Description of the Development**). The Site (all areas within the application boundary) is located on Forestry and Land Scotland (FLS) land at Cairnoch Hill within the Lennox Hills, immediately north of the Carron Valley Reservoir (within 30m), approximately 5.5km north of Kilsyth. The Site is wholly within Stirling Council administrative boundary and south of the operational Craigengelt, Earlsburn and Kingsburn wind farms.
- 9.1.4 This chapter includes the following elements:
- Assessment Methodology and Significance Criteria;
 - Baseline Conditions;
 - Assessment of Potential Effects;
 - Cumulative Effect Assessment;
 - Mitigation, Monitoring, and Residual Effects;
 - Summary of Effects; and
 - Statement of Significance.

Legislation, Policy and Guidance

- 9.1.5 The assessment has been undertaken in accordance with key policy, legislation and guidance as is standard for similar development proposals in this area. The relevant policy, legislation and guidance can be found in **Technical Appendix 4.1**. Guidance specific to Collision Risk Modelling (CRM) is listed within **Technical Appendix 9.3: Collision Risk Modelling Report** of Volume 4 of the EIA Report. Other references are used occasionally within this chapter as required.



9.2 Consultation

9.2.1 Consultation undertaken prior to the EIA Scoping stage has been described in the EIA Scoping Opinion. Relevant consultee responses included in the Scoping Opinion, and post-Scoping consultation relevant to Ornithology, is summarised in **Table 9-1**.

Table 9-1: Summary of Post Scoping Consultation for Ornithology

Consultation Details	Consultee Comments	Applicant Response
Subheading – e.g. to separate consultees if relevant		
<i>NatureScot, EIA Scoping Opinion response 11/10/2024</i>	<i>NatureScot are content with the scope of the proposed ornithological impact assessment. Collision risk modelling (CRM) will be undertaken as part of the ecological impact assessment (EIA) process in accordance with NatureScot guidance. They are also content that two years of baseline surveys will be, or has been, undertaken and that goose foraging surveys were scoped out prior to commencement of the ornithology baseline surveys due to data from Mitchell (2012), therefore scoping out Slamannan Plateau Special Protection Area (SPA) and Firth of Forth SPA.</i> <i>In addition, the EIA should include consideration of the likely impacts on designated sites with which the Proposed Development is in connectivity and the environmental statement should include suggestions for any mitigation required to address significant impacts on:</i> <i>• The qualifying interests of any European sites (Special Area of Conservation (SAC) and SPAs and sites of international interest and international interest (e.g. Ramsar sites), and</i> <i>• Notified features of Sites of Special Scientific Interest (SSSI).</i>	<i>Noted – the assessment was carried out as set out in the Scoping Opinion</i>
<i>NatureScot, osprey mitigation consultation letter 23/07/2025</i>	<i>NatureScot found the proposed approach of felling the current</i>	<i>We note the advice from NatureScot and further</i>



Consultation Details	Consultee Comments	Applicant Response
	<i>nest and replacing with at least one nest platform to be acceptable but advised that there is no guarantee that the osprey would uptake nest platforms. In addition, NatureScot note that it would be advisable to erect the platform a year or two in advance of felling the current nest site.</i>	<i>information from the Central Raptor Study Group (CRSG) and Forestry and Land Scotland (FLS) was sought to determine suitable locations for the platform and provide update.</i>
<i>NatureScot, Update to osprey mitigation consultation letter 27/05/2026</i>	<i>NatureScot have no particular comment with regards to siting of the platforms and trusts FLS and CRSG are best informed to advise on their placement. In addition, NatureScot have no particular objection to the proposed approach as described but recommend that a Natural Heritage Zone approach is used as part of the impact assessment. The Proposed Development could result in significant adverse effect to osprey, and there is significant uncertainty regarding the success of the proposed mitigation. NatureScot suggest that any biodiversity enhancement measures employed as part of the proposal are significant enough to sufficiently offset ant impacts of a scenario in which the platforms are not utilised by the target species (osprey).</i>	<i>Noted. The information from CRSG and FLS has been received and included within the assessment and the approach NatureScot has been followed.</i> The commitments to the osprey nest platforms are detailed in <i>Technical Appendix 8.6: Outline Habitat Management Plan</i>

9.3 Assessment Methodology and Significance Criteria

Proposed Development

9.3.1 It is currently anticipated that the Proposed Development would consist of up to four wind turbines with a tip height of up to 180m. The associated infrastructure is set out in **Chapter 3: Description of the Development** and would include the following components:

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



- Two temporary Site construction compounds.

Study Area

- 9.3.2 The Study Area comprises the Site and the survey buffers used during the baseline ornithological surveys. These included:
- Flight Activity Surveys (FAS): 500m buffer (hereafter FAS Survey Area);
 - Moorland Breeding Bird Surveys (MBBS): 500m buffer (hereafter MBBS Survey Area);
 - Black Grouse Surveys: 1.5km buffer; and
 - Breeding Raptor Surveys: 2km buffer.
- 9.3.3 The Study Area encompasses a 2km buffer in line with Table 1.6, Annex 1 of NatureScot (2025a) guidance and includes the area within which direct ornithological effects are most likely to occur as a result of the Proposed Development. The Study Area was extended to 20km during the Desk Study to consider potential for connectivity to designated sites, in line with NatureScot (2016a) guidance. Full details of the desk study results, including connectivity to designated sites, are presented in Section 9.4 Baseline Conditions: Designated Sites.
- 9.3.4 While the proposed wind turbine layout has changed since surveys were undertaken, all baseline surveys still cover the full extent of the Site and appropriate buffers outlined in NatureScot (2025a) guidance, with sufficient hours of survey undertaken.

Desk Study Methodology

- 9.3.5 A desk 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, in line with NatureScot (2016a; 2025f) guidance.
- 9.3.6 The NatureScot (2026) SiteLink online tool 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.
- 9.3.7 To gather records of historic breeding or roosting (within the last ten years) raptor species listed on Schedule 1 (including 1:1, 1A and A1) of the Wildlife and Countryside Act 1981 and / or Annex I of the Birds Directive, The CRSG was contacted in March 2022 and July 2025 and the Royal Society for the Protection of Birds ("RSPB") in April 2026.

Field Surveys

- 9.3.8 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 in **Technical Appendix 9.1: Year 1&2 Baseline Ornithology Reports**. It should be noted that Survey Areas were based on the Site Boundary at the time of survey which was slightly larger than the current Site Boundary. A summary of the baseline ornithology surveys undertaken, including survey effort is presented in **Table 9-2**.



9.3.9 The survey types and the periods that they were conducted are outlined below:

- Flight Activity Surveys (FAS; September 2021 to February 2022, March to August 2022, September 2022 to February 2023 and March to August 2023);
- Black Grouse Surveys (March to May 2022 and April 2023);
- Breeding Raptor Surveys (March to July 2022 and March to August 2023); and
- Moorland Breeding Bird Surveys (MBBS; May to July 2022 and May to June 2023).

Table 9-2: Summary of Baseline Survey Effort

Survey	2021-22 Non-breeding Season	2022 Breeding Season	2022-2023 Non-breeding Season	2023 Breeding Season
Flight Activity Surveys	X	X	X	X
Black Grouse Surveys		X		X
Breeding Raptor Surveys		X		X
Moorland Breeding Bird Surveys		X		X

9.3.10 In line with Section 3.5 of NatureScot (2025a) guidance, baseline ornithology surveys were undertaken over a two-year period between September 2021 and August 2023 inclusive. The survey methodology was developed based on the habitats present at the Site, the species assemblage known to occur in the area, and NatureScot (2017) guidance. Full details of the survey programme including the methodologies are provided in **Technical Appendix 9.1: Year 1&2 Baseline Ornithology Reports**. Details of confidential protected species are provided in the **Technical Appendix 9.2: Confidential Annex**.

9.3.11 Baseline ornithological surveys were completed prior to publication of the 2025 NatureScot guidance and were undertaken in accordance with the guidance applicable at that time. The subsequent inclusion of gulls as target species does not automatically require additional survey effort where the existing baseline is considered adequate to support a robust assessment. The assessment has considered the potential for effects on gull species using the available evidence (as set out in **Section 9.6**) and no requirement for further baseline surveys has been identified.

Flight Activity Surveys

9.3.12 FAS were completed between September 2021 and August 2022 in Year 1 and between September 2022 and August 2023 in Year 2, encompassing the non-breeding and breeding seasons. FAS involved a series of Vantage Point (“VP”) watches, to record flight activity of ‘target species’ within the Site and a 500m buffer in accordance with paragraph 3.8.3 of NatureScot (2017) guidance, as well as to inform the CRM.



- 9.3.13 Three VP locations were selected for their coverage of the Site using viewshed analysis, undertaken using Geographic Information Systems (“GIS”) and were ‘ground-truthed’ in the field to ensure that views were accurate. VPs and viewsheds are shown in **Technical Appendix 9.1: Year 1&2 Baseline Ornithology Reports**. The flight lines of all target species observed during the FAS were recorded on large scale maps in the field.
- 9.3.14 Target species included the following:
- All wild swan, goose and duck species (except Canada goose (*Branta canadensis*) and mallard (*Anas platyrhynchos*));
 - All Schedule 1-listed (including 1.1, 1A and A1) and Annex I-listed raptor and owl species;
 - All wader species;
 - Black grouse (*Lyrurus tetrix*), and
 - Nightjar (*Caprimulgus europaeus*).
- 9.3.15 A total of 72 hours of surveys per VP were completed each year, with survey effort split equally between breeding (March to August) and non-breeding seasons (September to February). Survey times were stratified to cover a range of times, including dawn and dusk, to account for temporal variation in activity. Full details of survey dates, times and hourly weather conditions are presented in **Technical Appendix 9.1: Year 1&2 Baseline Ornithology Reports**. Each flight was cross-referenced and recorded with the following flight data:
- Time (when first seen);
 - Species, age and sex (where identification of age/sex was possible);
 - Number of individuals;
 - Duration of flight within the VP viewshed; and
 - Flight height on detection and throughout, classified into four appropriate height bands determined by the proposed candidate wind turbine.
- The flight height bands used were:
1. < 10 m;
 2. 10-20 m;
 3. 21-200 m;
 4. > 200 m.
- 9.3.16 In addition, the flight activity of the following secondary species was recorded for every 5-minute period during each of the FAS: Canada goose, mallard, cormorant (*Phalacrocorax carbo*), grey heron (*Ardea cinerea*), all other raptor species (i.e. those not listed on Schedule 1:1, 1A and A1, or Annex I), all gull species and raven (*Corvus corax*). Recording of target species flights took priority over that of secondary species.

Black Grouse Surveys

- 9.3.17 Black Grouse Surveys were completed based on the method detailed in Gilbert *et al.* (1998) during the 2022 and 2023 breeding seasons. Surveys were conducted between mid-March to late April 2022 and in April 2023, with two and three visits completed respectively. The survey area covered all potentially suitable lekking



habitat within the Site and a surrounding 1.5km buffer (access permitting) in line with Annex 1, Table 1.6 of NatureScot (2017) guidance.

Breeding Raptor Surveys

- 9.3.18 Breeding Raptor Surveys of the Site and surrounding 2km buffer, following survey methods described in Hardey *et al.* (2013). In accordance with paragraph 3.7.2 of NatureScot, 2017 guidance, monthly survey visits were conducted between mid-March and early August, for both 2022 and 2023. Target species were defined as Schedule 1 (including 1.1, 1A and A1) or Annex I raptor species, with other breeding raptors recorded as secondary species.

Moorland Breeding Bird Surveys

- 9.3.19 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 paragraph 3.7.1 of NatureScot (2017) guidance, 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.

Baseline Survey Limitations

Access

- 9.3.20 Although there were no access restrictions within the Site, there were access limitations in some of the Survey Area buffers, including parts of the black grouse, breeding raptor and MBBS Survey Areas, where landowners had not given the surveyors permission to access the land and therefore these areas were surveyed using binoculars and telescopes from a distance. It is possible that some target species activity was missed during the surveys, for instance a black grouse survey on 17/04/2023 in the north of the Site was limited to the road only. This did not impact FAS as all VP locations were on accessible land.

Disturbance Events

- 9.3.21 Disturbance events during 2021/22 FAS included forestry-related activities, road traffic noise and helicopters, as well as recreational activities (dog walking and cycling) and farmers within the Site and 500m buffer. Further disturbance events occurred on two occasions during 2022/23 FAS, including the presence of forestry staff on Cairnoch Hill for one hour on 17/03/2026, three rowing boats and two paragliders over the reservoir during August. However, these events reported are considered to be representative of baseline disturbance and are therefore not considered to impact the robustness of the data collected.

Recording Secondary Species

- 9.3.22 As surveys were undertaken in line with NatureScot (2017) guidance, gull species were not considered a target species at the time of surveys and were recorded instead as secondary species. It is acknowledged that guidance has since been updated in 2025 and that gull species should be treated as target species. In light of this, the baseline survey data collected on gulls were evaluated and considered sufficient to be included within the determination of Important Ornithological Features (**Section 9.6**). This included the peak abundance of individuals in flight during FAS, which is considered sufficient for the assessment.



- 9.3.23 Secondary species were not recorded on two occasions: during one FAS visit in July 2023 due to the high volume of osprey flights, as well as during one FAS visit in April 2023 when gull flights were not recorded. This is in compliance with paragraph 3.2 of NatureScot (2017), which notes that the recording of secondary species is subsidiary to recording of target species.

Collision Risk Modelling Methodology

- 9.3.24 CRM methodology followed those outlined by Band *et al.* (2024). Data collected during the 2021-2023 FAS was used to predict the number of individuals of each species expected to collide with the wind turbine rotors. CRM was undertaken for all target species flights recorded within the Collision Risk Zone (the CRZ; a 500m buffer of the final turbine layout) which were present at sufficient levels to allow for robust modelling, using APEM's professional judgement.
- 9.3.25 CRM was conducted for the following species:
- Osprey (*Pandion haliaetus*);
 - Greylag goose (*Anser anser*); and
 - Pink-footed goose (*Anser brachyrhynchus*).
- 9.3.26 All other target species were scoped out of CRM due to the absence, or extremely low, levels of flight activity within the CRZ. The full CRM methodology, along with justification for species scoped into or out of modelling, is presented in **Technical Appendix 9.3: Collision Risk Modelling Report**.

Assessment of Potential Effect Level and Significance

- 9.3.27 The methodology used for the assessment of effects on ornithological receptors complies with CIEEM Guidelines for Ecological Impact Assessments in the UK and Ireland (CIEEM, 2024).

Scope of Assessment

- 9.3.28 The key issues for the assessment of potential ornithological effects relating to the Proposed Development are:
- Direct loss of breeding, foraging and/or roosting habitat through construction;
 - Displacement of birds as a result of disturbance during all phases of the Proposed Development. This includes barrier effects to commuting or migrating birds due to the presence of wind turbines or other infrastructure;
 - Death or injury through collision with wind turbine blades or other types of infrastructure; and
 - Cumulative effects on species and / or designated sites, resulting from construction, operation and decommissioning of the Proposed Development in conjunction with other developments that may also impact on the same populations. In line with NS guidance (NatureScot, 2025c), cumulative impacts will be assessed at a relevant biogeographical scale, such as the relevant Natural Heritage Zone (NHZ; NatureScot, 2002).

Assessing the Importance of Ornithological Features at Geographic Scales

- 9.3.29 CIEEM (2024) guidance provides a geographical framework for determining the importance of an ornithological feature. The following geographical scales were used in this assessment:



- International importance – important in a European or wider international context;
 - National importance – important in a Scottish context;
 - Regional importance – important in a regional context. i.e. within NHZ 17;
 - Local importance – locally important populations/assemblages of bird species and/or protected and/or priority species/habitats; and
 - Less than local.
- 9.3.30 Statutory sites for which are designated for, ornithological features, at different geographical scales are defined below:
- Internationally important – SPAs and Ramsar sites; and
 - Nationally important – SSSIs and NNRs.
- 9.3.31 The evaluation criteria for these geographic scales of importance are provided in **Table 9-3**. It should be noted that professional judgement has been used when defining importance, based on the level of species activity recorded during Baseline Ornithology Surveys. For example, where a Schedule 1 species has been recorded very rarely or not recorded within or close to the Proposed Development, its importance has been decreased.

Determining the Importance and Sensitivity of Receptors

- 9.3.32 In accordance with the latest CIEEM (2024) guidance, the approach used for the EIA 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.
- 9.3.33 Ornithological features can be considered important for a range of individual or cumulative factors. For instance, the degree of protection or status attributed to a species may relate to their range: the expansion or contraction of their range, or the extent to which they are threatened across their range. Population dynamics and short- and long-term trends are monitored for both breeding and non-breeding populations and the extent of their decline is a factor when determining the importance of a species, for example if the decline is severe (>50%) or moderate (>25% and <50%). A population may have been in historic decline or may be recovering. Attention is also given to their rarity, localisation and international importance.
- 9.3.34 The UK Government's Wild Bird Indicators are annual reports on the state of bird populations, which have been used to determine target species. In the UK, the latest review was published in September 2021 as Birds of Conservation Concern 5 (BoCC5; Stanbury *et al.*, 2021). In addition, The Scottish Government publishes a report of regionally important species in The Scottish Biodiversity List (Scottish Government, 2025).
- 9.3.35 In some cases, information relating to the size (and distribution) of local and regional populations can be limited or unavailable. Where this is the case and it is not clear whether a population is present in locally versus regionally (or regionally versus nationally) important numbers, a precautionary approach has been used, and the population is assessed as being of the higher level of importance.



9.3.36 Features assessed as being of local or less than local importance have not been taken forward for detailed assessment where professional judgement indicates that any effects would not undermine the conservation status or integrity of the feature and would therefore not be significant.

Table 9-3: Evaluation Criteria for Determining the Importance of Ornithological Features

Importance	Evaluation Criteria
International	- Statutory sites of international ornithological importance e.g. SPAs and Ramsar sites, with potential connectivity to the Site. - The regular presence within or around the Site of a qualifying species of an existing or proposed statutory site of international importance with potential connectivity to the Site. Numbers of birds making use of the Site are also taken into account. - The regular presence within or around the Site of other bird species that contribute to the integrity of an existing or proposed statutory site of international importance (such as a species which is part of an assemblage feature) with potential connectivity to the Site. Numbers of birds making use of the Site are also taken into account.
National (Scotland)	- Statutory sites of national ornithological importance (SSSI or NNRs) with potential connectivity to the Site. - The regular presence within or around the Site of a qualifying species of an existing or proposed statutory site of national importance with potential connectivity to the Site. Numbers of birds making use of the Site are also taken into account. - The regular presence within or around the Site of a species listed on Annex I of the Birds' Directive, where the species is not a cited interest of a statutory site but is present in nationally important numbers. - The regular presence within or around the Site of nationally important numbers of a species of conservation concern (BoCC5), where this is identified in NatureScot guidance (NatureScot, 2025d) as a priority for assessment. - The regular presence within or around the Site of nationally importance numbers of a migratory species which is rare or vulnerable or warrant consideration on account of the proximity of migration routes, or breeding, moulting, wintering or staging areas to a Proposed Development, and which is identified in guidance as a priority for assessment.
Regional (NHZ 17)	- A cited interest of an existing or proposed statutory site (i.e. SPA, Ramsar, SSSI or NNR) with potential connectivity to the Site but is only present within the Site infrequently or in low numbers. - Other species which contribute to the integrity of an existing or proposed statutory site (for example as part of an assemblage) with potential connectivity to the Site but is only present within the Site infrequently or in low numbers. - A species listed on Annex I of the Birds' Directive, where the species is not a cited interest of a statutory site and is regularly present in numbers of regional importance. - The regular presence within or around the Site of important numbers in the encompassing Natural Heritage Zone (NHZ 17)



Importance	Evaluation Criteria
	context of a species of conservation concern, where this is identified in NatureScot guidance as a priority for assessment.
Local	- Locally important populations of priority species identified in the Local Biodiversity Action Plans ("LBAP"). - Sites of local ornithological importance (e.g. Local Nature Reserves ("LNR"s)). - Species listed on Annex I of the Birds Directive that are present within or around the Site infrequently or in low numbers, and Site use is not expected to increase significantly post-construction. - Species identified in NatureScot guidance as a priority for assessment, but which are present within or around the Site infrequently or in low numbers, and Site use is not expected to increase significantly post-construction. - A locally important population/assemblage of a species of conservation concern that regularly occurs within or around the Site, but is not identified in NatureScot guidance as a priority for assessment and is unlikely to be at significant risk of impact from the Proposed Development.
Less than local	All other species that are widespread and common and of low conservation concern (e.g., included on the UK BoCC5 Green-list) and which are not present in locally important (or greater) numbers.

Methodology for Assessing Effects

9.3.37 The assessment of potential effects from the Proposed Development upon ornithological features has taken consideration of the following factors, in line with CIEEM guidance (2024):

- **Nature of effect:** whether it is positive (beneficial) to ornithological features, e.g. by increasing species diversity or extending habitat, or negative (adverse), e.g. by loss of, or displacement from suitable habitat;
- **Extent:** the spatial or geographical area over which the effect may occur;
- **Magnitude:** the size, amount, intensity and volume of the effect (**Table 9-4**);
- **Duration:** the duration of an effect as defined in relation to ornithological characteristics (such as species' life cycle) as well as human timeframes. The duration of the activity may differ from the duration of the resulting effects caused by the activity e.g. if short-term construction activities cause disturbance to breeding birds, there may be long-term implications from failure to reproduce that season;
- **Frequency:** the number of times an activity occurs may influence the resulting effect;
- **Timing:** the timing of an activity may result in an impact if it coincides with critical life stages or season (e.g. the breeding season);
- **Reversibility:** An irreversible effect is one from which recovery is not possible within a reasonable timescale or there is no reasonable chance of action being taken to reverse it.



Table 9-4: Magnitude of Effect Definitions.

Magnitude*	Description
Major	A large or total loss of a bird population through mortality or displacement.
Moderate	A partial reduction of a bird population through mortality or displacement.
Minor	A small reduction of a bird population through mortality or displacement.
Negligible	Very slight or no discernible reduction of a bird population or displacement.
No impact	The effect pathway has no impact on a bird population
*Professional judgement has been used in instances concerning precautionary records (e.g. raptor species where no breeding was confirmed)	

Significance of Effects

- 9.3.38 Following the classification of an effect based on the above factors, in line with CIEEM guidance (2024) and in consideration of the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations (2017), it is necessary to state whether an effect is “*significant*” or “*not significant*”. In line with CIEEM (2024) guidance, the significance of an effect on an ornithological feature has been determined based on analysis of the factors listed above, with CIEEM guidance (2024) stating that a “*significant effect*” is an effect that either supports or undermines biodiversity conservation objectives”.
- 9.3.39 Effects that are considered to be significant are identified within this chapter. The approach outlined in the CIEEM guidance (2024) discourages the use of a matrix to determine significance of impact. Instead the level, and therefore significance, of the resultant effect is informed by professional judgement as to the importance or sensitivity of the affected receptor(s) and the nature and magnitude of the predicted changes. Professional judgement is, however, equally important in verifying the suitability of this guiding ‘formula’ to the assessment of the level of each individual effect.
- 9.3.40 Therefore, professional judgement, informed by a species ecology, conservation status, population context and relevant literature and guidance, has been applied alongside the assessment of receptor importance and impact magnitude when determining overall significance. Effects assessed as being of moderate or greater level are considered to be significant in EIA terms.
- 9.3.41 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, 2025c), cumulative impacts will be assessed at a relevant biogeographical scale, such as the relevant NHZ (NHZ 17).

Committed Mitigation and Enhancement

- 9.3.42 Where potentially significant effects are identified, taking account of embedded (primary) and standard (tertiary) mitigation, additional mitigation measures (secondary mitigation) are described. These measures are presented as commitments, with information provided on how the mitigation can be secured, for example through planning conditions.
- 9.3.43 Committed enhancement measures relevant to Ornithology are also described where applicable.



Assessment of Residual Effect Level and Significance

- 9.3.44 The assessment of residual effects follows the same process and criteria as the assessment of potential effects but takes account of the committed additional (secondary) mitigation and enhancement measures.

Limitations to Assessment

- 9.3.45 Recent guidance published in 2025 stated that following significant declines in their populations, gull species should be considered target species (NatureScot 2025e). However, the baseline ornithological surveys were undertaken before the guidance was updated and gulls were treated as secondary species in line with best practice at the time.
- 9.3.46 Although presence of gull species and their abundance was recorded during FAS in line with the methodology, no detailed flight information was recorded in line with their status as secondary species. Therefore, it was not possible to undertake CRM for gull species.
- 9.3.47 A review of the baseline information, desk study data, site habitats and the ecological context of the Proposed Development has been undertaken to determine whether the omission of targeted gull surveys is likely to materially affect the assessment. Incidental records of gulls collected during field surveys have also been considered where relevant. A review of designated sites has identified no Special Protection Areas (SPAs) or other designated sites for which gull species are qualifying features that are considered likely to have connectivity with the Proposed Development.
- 9.3.48 Based on the information assessed, gulls are not considered to represent key ecological receptors for the assessment. On the basis of this review, it is considered that the available survey information provides an adequate characterisation of the ornithological baseline and is sufficient to inform a robust assessment of the potential for significant effects. The change in guidance is therefore not considered to represent a material limitation to the assessment.

9.4 Baseline Conditions

Desk-Based Study Results

Designated Sites

- 9.4.1 Two statutory sites with multiple designations for wintering geese were identified within 20km of the Site: Slamannan Plateau Special Protection Area ("SPA") and Site of Special Scientific Interest ("SSSI"); and Firth of Forth Ramsar site, SPA and SSSI.
- 9.4.2 Slamannan Plateau SPA and SSSI are located approximately 12.7km to the south-east of the Site (at the closest point), designated for wintering taiga bean goose (*Anser fabalis*).
- 9.4.3 The Firth of Forth Ramsar site, SPA and SSSI are located approximately 14.6km to the northeast of the Site (at the closest point) and are designated for wintering pink-footed goose in addition to an assemblage of other wintering waterfowl. Qualifying features recorded during the baseline ornithology surveys are detailed below in the results summaries of the *Flight Activity Surveys* and *Moorland Breeding Bird Surveys*.



Existing Records of Protected Species

- 9.4.4 CRSG provided details of two protected species confirmed to be breeding within the search area, as well as a further three protected species that were possibly breeding within the search area. Details of these species are provided in the **Technical Appendix 9.2: Confidential Annex**.
- 9.4.5 FLS provided two records of churring nightjar recorded on Site in July 2025, although there were no details of whether breeding was successful. The location of these territories are presented in **Figure 9.1**.
- 9.4.6 The Royal Society for the Protection of Birds (RSPB) were contacted for data concerning Cairnoch Hill, but they held no relevant records in the search area.

Flight Activity Surveys

- 9.4.7 FAS were conducted between September 2021 and August 2023 from three Vantage Point (VP) locations, selected for their coverage of the Site, and a 500m buffer of the Site was surveyed, in accordance with NatureScot (2017) guidance current at the time of surveys.
- 9.4.8 A total of 346 flights by 18 target species were recorded during surveys. A summary of target species flights is provided in **Table 9-5**. This includes flights of species discussed within the **Technical Appendix 9.2: Confidential Annex**. The most frequently recorded species was osprey with a total of 185 flights, followed by greylag goose (83 flights) and curlew (*Numenius arquata*, 16 flights).
- 9.4.9 Flight activity was low for all species other than osprey and greylag goose. Peak flight activity occurred in the 2023 breeding season, with 201 flights by target species, whereas the lowest flight activity was recorded in the 2022 non-breeding season, with 13 flights by target species.

Incidental Records of Target Species

- 9.4.9.1 Incidental records of target species included those not in flight or those that were heard but not seen. During FAS 2021/2022, low numbers of mute swan (*Cygnus olor*), curlew and snipe (*Gallinago gallinago*) were recorded, as well as flocks of 30-60 greylag goose and a single flock of 35 golden plover (*Pluvialis apricaria*). A large mixed flock of an estimated 200 ducks, including teal (*Anas crecca*) and goldeneye (*Bucephala clangula*), was recorded on the Carron Valley Reservoir during FAS on 28/09/2021.
- 9.4.9.2 Incidental records of target species during FAS 2022/2023 included great-crested grebe (*Podiceps cristatus*), garganey (*Anas querquedula*), two goldeneye, and a flock of 145 greylag geese on the reservoir. Additionally, a tawny owl (*Strix aluco*) was heard vocalising 200m south of VP3 on 26/05/2026.

Table 9-5: Summary of Target Species Flights Recorded during 2021-2023 Flight Activity Surveys

Species	Number of Flights					
	Year 1 Non-breeding Season	Year 1 Breeding Season	Year 2 Non-breeding Season	Year 2 Breeding Season	Total	No. of birds per flight
Greylag goose	4	56	9	14	83	1-30



Species	Number of Flights					
	Year 1 Non-breeding Season	Year 1 Breeding Season	Year 2 Non-breeding Season	Year 2 Breeding Season	Total	No. of birds per flight
Pink-footed goose	6	0	3	0	9	12-75
Mute swan	0	1	0	0	1	2
Teal	0	0	4	0	4	1-6
Pochard <i>Aythya ferina</i>	0	0	1	0	1	4
Tufted duck <i>Aythya fuligula</i>	0	0	3	0	3	1-5
Goldeneye	0	3	7	2	12	1-3
Goosander <i>Mergus merganser</i>	0	1	1	0	2	2
Great crested grebe	0	3	0	0	3	1
Oystercatcher <i>Haematopus ostralegus</i>	0	1	0	0	1	1
Curlew	0	14	0	2	16	1-15
Osprey	0	110	0	75	185	1-4
Goshawk <i>Accipiter gentilis</i>	2	4	1	0	7	1
Marsh harrier <i>Circus aeruginosus</i>	0	0	0	1	1	1
Hen harrier <i>Circus cyaneus</i>	1	0	0	0	1	1
Red kite <i>Milvus milvus</i>	0	5	7	0	12	1-2
Merlin <i>Falco columbarius</i>	0	0	0	1	1	1
Peregrine <i>Falco peregrinus</i>	0	3	0	1	4	1



Species	Number of Flights					
	Year 1 Non-breeding Season	Year 1 Breeding Season	Year 2 Non-breeding Season	Year 2 Breeding Season	Total	No. of birds per flight
TOTAL	13	201	36	96	346	



Black Grouse Surveys

- 9.4.11 No black grouse were recorded during any of the Year 1 (2022) or Year 2 (2023) Black Grouse Surveys and were not recorded during any other baseline survey. Black grouse is therefore scoped out of the assessment and not discussed further within this chapter.

Breeding Raptor Surveys

Target Raptor Species

- 9.4.12 During Year 1 (2022) Breeding Raptor Surveys, one target raptor species was confirmed to have bred within the Breeding Raptor Survey Area. A further three species were considered to either hold breeding territory or to have potentially bred in the Breeding Raptor Survey Area. Details of these four species can be found in the **Technical Appendix 9.2: Confidential Annex**. A single male hen harrier was also recorded in the Breeding Raptor Survey Area, although there was no evidence of breeding.
- 9.4.13 In the Year 2 (2023) Breeding Raptor Surveys, there was no evidence that any target raptor species had bred within the Breeding Raptor Survey Area. Osprey was regularly recorded around historic nest sites during April, and a pair were heard calling to one another in July, although no breeding territories were identified.
- 9.4.14 Despite being observed in both the Year 1 and Year 2 Breeding Raptor Surveys, there was no confirmed evidence that goshawk had bred within the Breeding Raptor Survey Area. Goshawk may have bred within the wider area as a pair was observed displaying within the 2km buffer during the Breeding Raptor Surveys in April.
- 9.4.15 Red kite was recorded once during the Breeding Raptor Survey in April 2023 and were occasionally recorded during VP surveys. This included a pair that were considered to have potentially bred or searching for a nesting site, but no further evidence of breeding was found. Further VP records included a single peregrine and merlin during March 2023 and July 2023 respectively, as well as a single juvenile marsh harrier in August 2023.
- 9.4.16 Data from the CRSG provided details of two protected species confirmed to be breeding within the Breeding Raptor Survey Area. Details can be found in the **Technical Appendix 9.2: Confidential Annex**.

Secondary Raptor Species

- 9.4.17 In the Year 1 Breeding Raptor Surveys, buzzard (*Buteo buteo*) was regularly recorded and as many as eight pairs were considered likely to have bred within the Site. Kestrel (*Falco tinnunculus*) was recorded on occasion and were considered to have bred, although no nest site was identified. A single registration of a female sparrowhawk (*Accipiter nisus*) carrying prey to the east of the Site suggested that sparrowhawk had bred within the Breeding Raptor Survey Area.
- 9.4.18 In the Year 2 Breeding Raptor Surveys, buzzard was recorded frequently and a total of five pairs were considered likely to have bred within the Site. There was a single registration of kestrel hunting during the breeding season, although no breeding territory was identified. Sparrowhawk was recorded occasionally, with a potential breeding territory identified within the 2 km buffer. During April 2023, a tawny owl was found to be nesting in a kestrel box within the Site.



Moorland Breeding Bird Surveys

- 9.4.19 A total of 67 species were recorded within the MBBS Survey Area, including 44 species of conservation concern (**Figure 9.1**). Two wader species (curlew and snipe) were considered to have bred or to have held territory within the MBBS Survey Area in both survey years. In addition, a further four species were considered to have bred or to have held territory in Year 1 (2022) MBBS: lapwing (*Vannellus vanellus*), common sandpiper (*Actitis hypoleucos*), redshank (*Tringa totanus*) and oystercatcher.
- 9.4.20 Breeding densities were relatively low across both years, with snipe breeding in the highest density within the MBBS Survey Area (eight territories) in Year 1 and holding a single territory in Year 2, followed by curlew with six territories in Year 1 and five territories in Year 2.
- 9.4.21 A total of three lapwing territories, two oystercatcher and common sandpiper territories, and a single redshank territory were recorded in the Year 1 MBBS, with none of these species breeding during Year 2. All wader territories were outwith the Site.
- 9.4.22 In addition to the aforementioned waders and raptors, a further 10 non-passerine species of conservation concern were recorded, as well as 23 passerine species of conservation concern, however no additional Schedule 1 species or other notable breeding species were recorded.

Collision Risk Modelling

- 9.4.23 For each species for which CRM was completed, the predicted collisions in each breeding and non-breeding season, as well as annually, are outlined in the tables below.
- 9.4.24 Osprey has been modelled under two scenarios. The first scenario is based on flight activity recorded during baseline surveys. The second scenario has been modelled to account for planned mitigation involving relocation of this nest to an artificial nesting platform outwith the turbine envelope (further detailed in **Technical Appendix 9.2: Confidential Annex** and **Technical Appendix 8.6: Outline Habitat Management Plan**).
- 9.4.25 CRM took into account species-specific avoidance rates as recommended by NatureScot (Annex 1 of NatureScot, 2010; Table 1 of NatureScot, 2025e) guidance when determining predicted collisions. Predicted collisions have been calculated for a four wind turbine layout and one proposed candidate wind turbine model, at a hub height of 99m and a minimum rotor swept height of 18m.
- 9.4.26 The full CRM results are detailed in **Technical Appendix 9.3: Collision Risk Modelling Report**, and in **Table 9-6**.



Table 9-6: Predicted Collisions for Each Species Included in CRM

Species	NatureScot avoidance rates	Predicted collisions per breeding season*	Predicted collisions per non-breeding season	Predicted annual collisions**	Predicted years per collision	Predicted collisions during Proposed Development operational lifespan (40 years)
Greylag goose	99.8%	0.013	0.059	0.072	13.847	13.850
Pink-footed goose	99.8%	0.000	0.005	0.005	209.760	0.191
Osprey	98.0%	2.571	0.000	2.571	0.389	102.823
*Seasonal collision risk was calculated using the breeding season dates stated in NatureScot (NatureScot, 2014) guidance.						
**Sum of non-breeding and breeding season predicted collisions. Note that all figures have been rounded to three decimal places.						



Future Baseline in Absence of Proposed Development

- 9.4.27 In the absence of the Proposed Development, changes in the current baseline ornithology conditions (i.e. the distribution and populations of birds) are expected to be minor, in line with the current commercial forestry felling plans. The breeding and wintering bird communities will also change in line with regional trends, with some species reducing in abundance, and others increasing.
- 9.4.28 Baseline surveys carried out for the Proposed Development represent a snapshot of the bird community at the time and the potential effects of climate change on ornithology features are difficult to predict. The hotter, drier, summer climate may impact the community of breeding species and could impact the ground-nesting species, such as waders.

9.5 Embedded and Standard Mitigation

- 9.5.1 The ornithological assessment has concluded that the Proposed Development would not result in any significant ornithological effects, but nonetheless, the embedded and standard mitigation measures described below would be followed and will ensure compliance with the nature conservation legislation. Furthermore, measures to benefit biodiversity will need to be delivered as part of the project to satisfy the National Planning Framework 4 (NPF4).

Embedded Mitigation

- 9.5.2 Embedded mitigation measures are those measures that are inherent to the Proposed Development. This includes mitigation by design (also known as Primary Mitigation), implemented through design iteration works as described in **Chapter 2: Design Evolution and Alternatives**.
- 9.5.3 Ornithological features have been considered at all stages of the Proposed Development design, from initial feasibility to final layout. Minimising collision risk through design was one of the key considerations during the design process, particularly for breeding osprey. This involved locating turbines away from high value habitats, breeding IOF territories and areas of regular flight activity.

Standard Mitigation

- 9.5.4 Standard mitigation (also known as Tertiary Mitigation) includes all mitigation usually assumed to be in place during construction, operation and decommissioning, and is generally regarded as industry standard or Best Practice. Committed standard mitigation measures are set out in **Chapter 2: Design Evolution and Alternatives**, the following being specifically applicable to Ornithology:

Construction phase

- 9.5.5 **Ecological Clerk of Works (ECoW):** To ensure that mitigation measures are reactive to changing conditions on Site and ensure compliance with legislation protecting sensitive breeding birds, it is recommended that a suitably experienced ECoW attends the Site regularly to monitor birds present in and around the areas where works are planned, identify any potential constraints to Proposed Development and provide specific ornithological guidance.
- 9.5.6 **Pre-construction surveys:** Pre-construction surveys will be undertaken to identify any breeding birds nesting within or close to working areas. Surveys will be undertaken by the ECoW, who will determine the scope of surveys required, which



- will be based on current disturbance guidance and professional judgement (Goodship and Furness, 2022).
- 9.5.7 **Toolbox talk:** A ‘toolbox talk’ will be delivered prior to construction, and at regular intervals, by a suitably experienced ECoW to ensure that all contractors working on the Proposed Development are aware of ornithological sensitivities and relevant legislation.
- 9.5.8 **Timing of works:** Given the anticipated construction period, some construction work will take place during the breeding season (March to August). No works will start during the breeding season without first establishing the status of breeding birds within likely disturbance distances of the proposed works.
- 9.5.9 **Protection of nesting birds:** It is an offence to:
- Kill, injure or take a wild bird
 - Take, damage, destroy or interfere with a nest of any wild bird whilst it is in use or being built;
 - Obstruct or prevent any wild bird from using its nest; or
 - Take or destroy an egg of any wild bird.
- 9.5.10 If any active nests are identified during pre-construction surveys which could be damaged or destroyed, an exclusion zone around the nest/breeding territory will be established which would be informed by current guidance (Goodship and Furness, 2022). No works will be permitted within the exclusion zone, and no personnel or vehicles will be allowed to enter or pass through until the ECoW has confirmed that the nesting attempt has reached a natural conclusion. Schedule 1, 1A, and A1 birds are subject to additional protection and cannot be intentionally or recklessly disturbed, while there are further species listed on Annex 1 of the EU Birds Directive.
- 9.5.11 **Minimising disturbance from Site vehicles:** Where construction works are required during the breeding bird season, mitigation measures to limit the impact of vehicular disturbance will be implemented. This will include no idling of vehicles, appropriate speed restrictions and dust suppression measures on Site.

Operational phase

- 9.5.12 Routine maintenance required during operation is expected to be minimal, limited to small areas and of temporary duration. However, should significant operational works (for example widespread track upgrades or wind turbine replacement) be required during the breeding bird season, the mitigation measures outlined above for the construction phase will be implemented to ensure compliance with the relevant legislation.

Decommissioning phase

- 9.5.13 As decommissioning works are likely to be of a similar nature and duration as construction activities, the mitigation measures outlined above for the construction phase will be implemented to ensure compliance with relevant legislation.



9.6 Scope of Assessment

Determination of Important Ornithological Features

9.6.1 **Table 9-7** provides the rationale for the determination of whether a receptor should be considered an IOF. This rationale considers the importance of the receptor and its presence (of a single species and/or qualifying feature) within and around the turbine layout. When determining whether a designated site is an IOF, the connectivity of the qualifying features of the designated site to the Proposed Development has been considered. Connectivity to the Proposed Development is determined using the core foraging range of species and available literature (e.g. tracking studies), in line with NatureScot (2025d; 2025f; 2016a) guidance. Using professional judgement in accordance with the guidance, it is considered that the core foraging of waders during the non-breeding season is 15 km (NatureScot, 2023¹).

Table 9-7: Avifauna Key Receptors Scoped Into/Out of the Assessment as Important Ornithological Features

Species/Site	Conservation status	IOF	Rationale
Species scoped into assessment as IOFs			
Greylag goose	BoCC5 Amber List Schedule 1 (Outer Hebrides, Caithness, Sutherland, and Wester Ross only) NatureScot priority species for assessment	Yes	Greylag goose is an amber-listed species of conservation concern in the UK due to the international importance and localisation of the wild non-breeding population (Stanbury <i>et al.</i> , 2021). The UK non-breeding population of greylag goose is estimated at 230,000 individuals (2012/13-2016/17; Woodward <i>et al.</i> , 2020). However, the UK population of greylag goose is comprised mainly of feral birds, with a native resident population, and a migratory population from Iceland. The 10-year trend (2013/14 – 2023/24) for the British and Irish population shows an increase of 19%, but the Icelandic population has declined by 44% in the same period (Frost <i>et al.</i> , 2026). High levels of flight activity were recorded during the first year of FAS and moderate flight activity was recorded in the second year (83 flights in total across two years of

¹ Guidance Note 4: Guidance to Support Offshore Wind Applications: Ornithology - Determining Connectivity of Marine Birds with Marine Special Protection Areas and Breeding Seabirds from Colony SPAs in the Non-Breeding Season



Species/Site	Conservation status	IOF	Rationale
			FAS). The peak month for activity was March, which could represent the migrating population of Icelandic greylag goose. However, a flock of 145 individuals were recorded anecdotally on Carron Valley reservoir during a June MBBS survey, suggesting both feral and wild populations of greylag goose may use the Site.
Pink-footed goose	BoCC5 Amber List	Yes	Pink-footed goose is an amber-listed wildfowl species of conservation concern in the UK due to the international importance and localisation of the non-breeding population (Stanbury <i>et al.</i>, 2021). The 2024/2025 non-breeding population of pink-footed goose was 184,945 individuals in Scotland (Frost <i>et al.</i>, 2026). The 10-year trend (2013/14 – 2023/24) for Scotland shows a 0% change in pink-footed goose populations, however the 25-year trend (1998/99) for Scotland shows a 90% increase (Frost <i>et al.</i>, 2026). The NHZ 17 non-breeding population was estimated at 16,237. Low levels of flight activity were recorded during FAS (nine flights total), with flocks ranging between 12 and 75 individuals. Records of this species were predominately in September (eight out of nine records) and likely represent migrating flocks travelling south for winter.
Nightjar	BoCC5 Amber List, Annex 1, Scottish Biodiversity List	Yes	Nightjar is an amber-listed species of conservation concern in the UK due to a moderate breeding range decline (> 25% but < 50%). Nightjar is also listed on Annex 1 and SBL. The most recent population estimate for Scotland was 27 territories (churring males) in 2004 (Conway and Henderson, 2005). This species is rare outside of its stronghold of south-west Scotland and only sporadically recorded in central Scotland. No nightjar were recorded during either year of baseline monitoring and no specific surveys were undertaken due to the Site falling outside this species typical range, however consultation with FLS revealed two churring males were recorded in the area in 2025. Therefore, considering their rarity in a Scottish and NHZ context and the proximity of the territories to proposed infrastructure (Figure 9.1) nightjar has been scoped into the assessment on a precautionary basis.
Oystercatcher	Near threatened, BoCC5 Amber List	Yes	Oystercatcher is an amber-listed species of conservation concern in the UK due to the localisation of the non-breeding population, as well as international importance of its



Species/Site	Conservation status	IOF	Rationale
			breeding and non-breeding populations (Stanbury <i>et al.</i>, 2021). The 2024/25 non-breeding population of oystercatcher was 60,324 individuals in Scotland, and the latest breeding population estimate was 84,500-116,500 breeding pairs in Scotland (Forrester <i>et al.</i>, 2012) and 95,500 pairs in the UK (2016; Woodward <i>et al.</i>, 2020). The 10-year trend (2013/14 – 2023/24) for Scotland shows a -18% decline in oystercatcher populations, and the 25-year trend (1998/99) for Scotland shows a -40% decline (Frost <i>et al.</i>, 2026). There is no current NHZ 17 breeding population estimate for oystercatcher. A single flight was recorded in the breeding season during Year 1 FAS. Two breeding territories were identified during Year 1 (2022) in the south-east of the MBBS Survey Area. A single individual flew over the area during the second year of MBBS, but no evidence of breeding was confirmed.
Lapwing	Near threatened BoCC5 Red List, Scottish Biodiversity List NatureScot priority species for assessment	Yes	Lapwing is a red-listed species of conservation concern in the UK due to severe declines to its breeding population and moderate declines to its non-breeding population (Stanbury <i>et al.</i>, 2021). Lapwing is also listed on the SBL. The 2024/25 non-breeding population of lapwing was 37,225 individuals in Scotland, and the latest breeding population estimate was 97,500 pairs in the UK (2016; Woodward <i>et al.</i>, 2020). The 10-year trend (2013/14 – 2023/24) for Scotland shows a -18% decline in lapwing populations, and the 25-year trend (1998/99) for Scotland shows a 70% decline (Frost <i>et al.</i>, 2026). There is no current NHZ 17 breeding population estimate for lapwing. No flights were recorded for lapwing during FAS. Three breeding territories were confirmed in the south-east of the MBBS Survey Area (within the 500m buffer of the Site Boundary) in Year 1 (2022). Two single individuals were recorded during Year 2 MBBS, although there was no evidence of breeding.
Curlew	Near threatened BoCC5 Red List, Scottish Biodiversity List	Yes	Curlew is a red-listed species of conservation concern in the UK due to declines in the breeding and non-breeding populations. Curlew is also listed on the SBL. The Scottish population of curlew was estimated at 58,800 breeding pairs and 85,700 individuals in the non-breeding season (Forrester <i>et al.</i>, 2012). The last breeding population estimate of curlew in NHZ 17 was 2,303 pairs in 2005 (Wilson <i>et al.</i>, 2015).



Species/Site	Conservation status	IOF	Rationale
	NatureScot priority species for assessment		There were low levels of flight activity in the first survey year and very low levels of flight activity in second survey year (16 flights total), with all flights occurring in the breeding season. Curlew was the most frequently recorded species during MBBS, totalling 11 breeding territories, with six and five territories recorded in the first and second survey years respectively.
Snipe	BoCC5 Amber List	Yes	Snipe is an amber-listed species of conservation concern in the UK due to moderate declines to its breeding and non-breeding populations (Stanbury <i>et al.</i>, 2021). The 2024/25 non-breeding population of snipe was estimated at 199,000 individuals in Scotland (2019/20; Martay <i>et al.</i>, 2023), and the latest breeding population estimate was 66,500 pairs in the UK (2016; Woodward <i>et al.</i>, 2020) and 46,000-85,300 in Scotland (2022; Martay <i>et al.</i>, 2023). The last breeding population estimate of snipe in NHZ 17 was estimated at 568 pairs in 2000 (Wilson <i>et al.</i>, 2015). Breeding populations in Scotland increased by 20% from 1994 to 2022 (NatureScot, 2024), so the NHZ 17 population of this species may have increased since the last estimate. No flights were recorded during FAS for snipe, which was recorded only incidentally during Year 1 FAS in low numbers. As a crepuscular/nocturnal species, snipe can be difficult to record during standard FAS. Eight breeding territories were identified within the MBBS Survey Area in 2022, with two present in the north, two in the north-east and four in the south-east, whereas only a single territory was identified in the east during Year 2 MBBS (2023).
Osprey	BoCC5 Amber List, Schedule 1, Annex 1, Scottish Biodiversity List	Yes	Osprey is an amber-listed species of conservation concern in the UK due to its recovery from historical declines (osprey was previously red-listed in BoCC1) and being classified as a rare-breeder (Stanbury <i>et al.</i> , 2021). In addition, osprey is listed on Annex 1 of the EU Bird Directive, Schedule 1 of the Wildlife and Countryside Act 1981, and the SBL. The most recent population estimate for breeding osprey in Scotland was 229 pairs in 2021 (Peniche <i>et al.</i> , 2025). The population is thought to be increasing in Scotland (Peniche <i>et al.</i> , 2025). The NHZ 17 population of osprey was estimated at five pairs in 2013 (Wilson <i>et al.</i> , 2015), while the Central Region covered by the Scottish Raptor Monitoring Scheme (SRMS) which contains the Site had an estimated 32 pairs



Species/Site	Conservation status	IOF	Rationale
	NatureScot priority species for assessment		(occupied home ranges), with 21 within the Stirling Council area in 2023 (Peniche <i>et al.</i>, 2025). Very high levels of flight activity were recorded in both survey years, and breeding was recorded in 2022, with an estimated three territories. CRSG provided information about 16 osprey territories/breeding attempts between 2023 and 2025 within 5km of the Proposed Development. Information relating to breeding osprey is provided in Technical Appendix 9.2: Confidential Annex and Technical Appendix 9.4: Additional Confidential Annex.
Goshawk	BoCC5 Green List, Schedule 1 NatureScot priority species for assessment	Yes	Goshawk is a green-listed species in the UK, however, is listed on Annex 1 of the EU Bird Directive, Schedule 1 of the Wildlife and Countryside Act 1981, and the SBL. The most recent population estimate for goshawk in Scotland was 315 breeding pairs in 2022 (Peniche <i>et al.</i>, 2025), and 1050-1450 individuals in winter (Forrester <i>et al.</i>, 2012). The NHZ 17 breeding population of goshawk was estimated at <5 pairs in 2013 (Wilson <i>et al.</i>, 2015). NHZ 17. The Central Region covered by the SRMS which contains the Site had an estimated 14 pairs (occupied home ranges), all within the Stirling Council area in 2023 (Peniche <i>et al.</i>, 2025). The Scottish population of this species is thought to be increasing so the NHZ 17 population of this species may have increased since the last estimate. Goshawk was recorded occasionally during both years of FAS, with six flights recorded in Year 1 and one flight recorded in October in Year 2. Breeding was considered possible in Year 1 (2022), with an estimated two breeding territories. No breeding territories were confirmed in Year 2, but it was considered likely that this species may have bred in the wider area or parts of the Breeding Raptor Survey Area. CRSG provided information on two goshawk territories and/or potential territories in 2025 that are within 2km of the Proposed Development Further detail regarding breeding goshawk is provided in Technical Appendix 9.2: Confidential Annex and Technical Appendix 9.4: Additional Confidential Annex.



Species/Site	Conservation status	IOF	Rationale
Red kite	BoCC5 Green List, Schedule 1, Annex 1, Scottish Biodiversity List NatureScot priority species for assessment	Yes	Red kite is a green-listed species in the UK, however, is listed on Annex 1 of the EU Bird Directive, Schedule 1 of the Wildlife and Countryside Act 1981, and the SBL. The most recent population estimate for breeding red kite in Scotland was 254 pairs in 2022 (Peniche <i>et al.</i>, 2025), with 300-350 individuals in winter (Forrester <i>et al.</i>, 2012). The NHZ 17 breeding population of red kite was estimated at 0 pairs in 2013, however the Central Region covered by the Scottish Raptor Monitoring Scheme which contains the Site had an estimated 24 pairs (occupied home ranges) in 2023, of which 23 were within the Stirling Council area (Peniche <i>et al.</i>, 2025). The Scottish population of this species is thought to be increasing and based on the SRMS population estimate the NHZ 17 population of this species is likely to be an underestimate. Low levels of flight activity were recorded in both survey years, with five flights recorded in the breeding season during Year 1 FAS and seven flights recorded in the non-breeding season during Year 2 FAS. Red kite was observed on occasion during the Breeding Raptor Surveys and as a precautionary approach, one territory within the Site was estimated in Year 1 (2022). In Year 2 (2023), it was considered possible that this species was pair bonding or nest searching within the Breeding Raptor Survey Area, although no breeding territories were confirmed. Further detail regarding breeding red kite is provided in Technical Appendix 9.2: Confidential Annex.
Peregrine	BoCC5 Green List, Schedule 1, Annex 1, Scottish Biodiversity List NatureScot priority species for assessment	Yes	Peregrine is a green-listed species in the UK, however, is listed on Annex 1 of the EU Bird Directive, Schedule 1 of the Wildlife and Countryside Act 1981, and the SBL. The most recent population estimate for breeding peregrine in Scotland was 479-592 pairs in 2014 (Peniche <i>et al.</i>, 2025), with 2,000-2,500 individuals in winter (Forrester <i>et al.</i>, 2012). The NHZ 17 breeding population of peregrine was estimated at 41 pairs in 2014 and is thought to be increasing in lowland areas (Wilson <i>et al.</i>, 2015). The Central Region covered by the Scottish Raptor Monitoring Scheme which contains the Site had an estimated 16 pairs (occupied home ranges) in 2023, of which seven were within the Stirling Council area (Peniche <i>et al.</i>, 2025).



Species/Site	Conservation status	IOF	Rationale
			Low levels of flight activity were recorded in the breeding season only, with three flights observed in Year 1 FAS and one flight recorded in Year 2 FAS. Breeding was considered possible and as a precautionary approach, one breeding territory was identified within the 2km buffer of the Site during the Breeding Raptor Surveys. Further detail regarding breeding peregrine is provided in Technical Appendix 9.2: Confidential Annex .
Sites scoped out of assessment			
Slamannan Plateau SPA	N/A	No	Slamannan Plateau SPA is designated for nationally important numbers of migratory taiga bean goose. The designated site is located approximately 12.7km to the south-east of the Site (at the closest point). Therefore, there is potential for connectivity to the Site and impacts on qualifying species. However, no taiga bean goose was recorded during any survey. Therefore, it is considered there is no connectivity between the Proposed Development and the qualifying species population. This site was scoped-out of further assessment at Scoping stage, which was agreed by consultees.
Firth of Forth SPA	N/A	No	The Firth of Forth SPA is designated for 26 species of non-breeding waterbirds, one species of seabird during the passage period, and the waterbird assemblage. The designated site is located 14.6km to the north east of the Site (at the closest point). Therefore, there is potential for connectivity to the Site and impacts on qualifying species. Low levels of pink-footed goose flight activity were recorded during the baseline surveys, however most records are thought to relate to migrating flocks of pink-footed goose moving south. Furthermore, a tracking study showed there is no connectivity between the Proposed Development site and the First of Forth SPA (Mitchell, 2012). This site was scoped-out of further assessment at Scoping stage, which was agreed by consultees.



Species/Site	Conservation status	IOF	Rationale
Species scoped out of assessment			
Mute swan	BoCC5 Green List	No	Mute swan is a green-listed species in the UK. The 2024/25 non-breeding population of mute swan was 8,028 individuals in Scotland, and the latest breeding population estimate was 6,300-7,600 pairs in the UK (2016; Woodward <i>et al.</i>, 2020). The 10-year trend (2013/14 – 2023/24) for Scotland shows a -10% decline in mute swan populations, and the 25-year trend (1998/99) for Scotland shows a -10% decline (Frost <i>et al.</i>, 2026). There is no current NHZ 17 breeding population estimate for this species. A single flight of two individuals during the breeding season in Year 1 FAS. Mute swan has not been considered an IOF due to the low levels of activity within and adjacent to the Site. It is not predicted that any significant effects will occur to this species.
Teal	BoCC5 Amber List	No	Teal is an amber-listed species of conservation concern within the UK due to the non-breeding population being of international importance. The 2024/25 non-breeding population of teal was 43,858 individuals in Scotland, and the latest breeding population estimate was 2,700-4,750 pairs in the UK (2016; Woodward <i>et al.</i>, 2020). The 10-year trend (2013/14 – 2023/24) for Scotland shows a 3% increase in teal populations, and the 25-year trend (1998/99) for Scotland shows a -4% decline (Frost <i>et al.</i>, 2026). There is no current NHZ 17 breeding population estimate for this species. Four flights with a peak of three individuals were recorded during the non-breeding season in Year 2 FAS. Teal has not been considered an IOF due to the low levels of activity within and adjacent to the Site. It is not predicted that any significant effects will occur to this species.
Pochard	Vulnerable, BoCC5 Red List,	No	Pochard is a red-listed species of conservation concern within the UK due to being listed as vulnerable on the IUCN Red List and severe declines in breeding and non-breeding ranges and populations (Stanbury <i>et al.</i>, 2021). Furthermore, pochard is listed on the SBL. The 2024/25 non-breeding population of pochard in Scotland was estimated at



Species/Site	Conservation status	IOF	Rationale
	Scottish Biodiversity List		1,900 individuals (Frost <i>et al.</i>, 2026), and the latest breeding population estimate was 720 pairs in the UK (2013-2017; Woodward <i>et al.</i>, 2020). The 10-year trend (2013/14 – 2023/24) shows a -42% decline in pochard, and the 25-year trend (1998/99) for Scotland shows a -79% decline (Frost <i>et al.</i>, 2026). There is no current NHZ 17 breeding population estimate for this species. There was a single flight record of four pochard in October 2022. Pochard has not been considered an IOF due to the low levels of activity within and adjacent to the Site. It is not predicted that any significant effects will occur to this species.
Tufted duck	BoCC5 Green List	No	Tufted duck is a green-listed species in the UK. The 2024/25 non-breeding population of tufted duck was 14,333 individuals in Scotland, and the latest breeding population estimate was 16,500-19,000 pairs in the UK (2016; Woodward <i>et al.</i>, 2020). The 10-year trend (2013/14 – 2023/24) for Scotland shows a -28% decline in tufted duck populations, and the 25-year trend (1998/99) for Scotland shows a -25% decline (Frost <i>et al.</i>, 2026). There is no current NHZ 17 breeding population estimate for this species. Three flights with a peak of five individuals were recorded in the non-breeding season of Year 2 FAS. Tufted duck has not been considered an IOF due to the low levels of activity within and adjacent to the Site. It is not predicted that any significant effects will occur to this species.
Goldeneye	BoCC5 Red List, Schedule 1	No	Goldeneye is a red-listed species of conservation concern within the UK due to severe declines to the non-breeding population (>50%) and the rarity of the breeding population (<300 pairs). Goldeneye is also listed on Schedule 1 of the Wildlife and Countryside Act 1981. The 2024/25 non-breeding population of goldeneye was 8,201 individuals in Scotland, and the latest breeding population estimate was 200 pairs in the UK (2006-2010; Woodward <i>et al.</i>, 2020). The 10-year trend (2013/14 – 2023/24) for Scotland shows a -12% decline in goldeneye populations, and the 25-year trend (1998/99) for Scotland shows a -34% decline (Frost <i>et al.</i>, 2026). There is no current NHZ 17 breeding population estimate for this species. A total of 12 flights were recorded for goldeneye during FAS, with a peak of three individuals. Three flights were recorded in the Year 1 breeding season and seven in the



Species/Site	Conservation status	IOF	Rationale
			Year 2 non-breeding season. Goldeneye has not been considered an IOF due to the low levels of activity within and adjacent to the Site. It is not predicted that any significant effects will occur to this species.
Goosander	BoCC5 Green List	No	Goosander is a green-listed species in the UK. The 2024/25 non-breeding population of goosander was 2,784 individuals in Scotland, and the latest breeding population estimate was 4,250–5,250 pairs in the UK (2016; Woodward <i>et al.</i>, 2020). The 10-year trend (2013/14 – 2023/24) for Scotland shows a -18% decline in goosander populations, and the 25-year trend (1998/99) for Scotland shows a -18% decline (Frost <i>et al.</i>, 2026). There is no current NHZ 17 breeding population estimate for this species. Two flights of two individuals were recorded during the Year 1 breeding season and the Year 2 non-breeding season. Goosander has not been considered an IOF due to the low levels of activity within and adjacent to the Site. It is not predicted that any significant effects will occur to this species.
Great crested grebe	BoCC5 Green List	No	Great crested grebe is a green-listed species in the UK. The 2024/25 non-breeding population of great crested grebe was 775 individuals in Scotland, and the latest breeding population estimate was 4,900 pairs in the UK (2016; Woodward <i>et al.</i>, 2020). The 10-year trend (2013/14 – 2023/24) for Scotland shows a -16% decline in great crested grebe populations, and the 25-year trend (1998/99) for Scotland shows a -46% decline (Frost <i>et al.</i>, 2026). There is no current NHZ 17 breeding population estimate for this species. Three flights for a single individual were recorded during the breeding season of Year 1 FAS. Great crested grebe has not been considered an IOF due to the low levels of activity within and adjacent to the Site. It is not predicted that any significant effects will occur to this species.
Common sandpiper	BoCC5 Amber List	No	Common sandpiper is an amber-listed species of conservation concern within the UK due moderate declines (>25% and <50%) to the breeding population and to the rarity of the non-breeding population. The 2024 non-breeding population of common sandpiper was 397 individuals in Scotland, and the latest breeding population estimate was 13,000



Species/Site	Conservation status	IOF	Rationale
			pairs in the UK (2016; Woodward <i>et al.</i>, 2020). The 10- or 25-year trends have not been assessed for this species and there is no current NHZ 17 breeding population estimate for this species. No flights were recorded for this species, and two possible breeding territories were identified in the south-east of the MBBS Survey Area in Year 1 (2022), although none were confirmed in Year 2 (2023). Common sandpiper has not been considered an IOF due to the low levels of activity within and adjacent to the Site. It is not predicted that any significant effects will occur to this species.
Redshank	BoCC5 Amber List	No	Redshank is an amber-listed species of conservation concern within the UK due moderate declines (>25% and <50%) to the breeding population and its breeding range, as well as to the international importance of the non-breeding population (Stanbury <i>et al.</i>, 2021). The 2024/25 non-breeding population of redshank was 24,357 individuals in Scotland, and the latest breeding population estimate was 22,000 pairs in the UK (2016; Woodward <i>et al.</i>, 2020). The 10-year trend (2013/14 – 2023/24) for Scotland shows a 3% increase in redshank populations, and the 25-year trend (1998/99) for Scotland shows a -32% decline (Frost <i>et al.</i>, 2026). There is no current NHZ 17 breeding population estimate for this species. No flights were recorded for this species, and a single breeding territory was considered possible in the south-east of the MBBS Survey Area. Redshank has not been considered an IOF due to the low levels of activity within and adjacent to the Site. It is not predicted that any significant effects will occur to this species.
Gull species (black-headed gull [<i>Chroicocephalus ridibundus</i>], common gull [<i>Larus canus</i>], great black-backed gull [<i>Larus marinus</i>], herring gull [<i>Larus argentatus</i>], lesser black-backed gull [<i>Larus fuscus</i>])	BoCC5 Red List (great black-backed gull, herring gull only), BoCC5 Amber List	No	The gull species recorded during the baseline monitoring surveys are BoCC5 Red List or Amber List species, with black-headed gull and herring gull being SBL species (Stanbury <i>et al.</i>, 2021). As discussed within <i>Limitations to Assessment</i>, gull species were not considered target species for the baseline monitoring surveys as they were undertaken prior to the 2025 guidance update (NatureScot, 2025), however a review of the available survey data has



Species/Site	Conservation status	IOF	Rationale
	Scottish Biodiversity List (black-headed gull, herring gull only).		been undertaken in light of the updated guidance. Gull species were regularly recorded as Secondary Species. FAS results for gull species are as follows: - Black-headed gull - Recorded in 18 FAS in Year 1 at a peak count of 200 individuals; - Recorded in 16 FAS in Year 2 at a peak count of 20 individuals; - Common gull - Recorded in fewer than 10 FAS in Year 1 at a peak count of 19 individuals; - Recorded in fewer than 10 FAS in Year 2 at a peak count of fewer than 10 individuals; - Great black-backed gull - Recorded in 23 FAS in Year 1 at a peak count fewer than 10 individuals; - Recorded in 15 FAS in Year 2 at a peak count of fewer than 10 individuals; - Herring gull - Recorded in fewer than 10 FAS in Year 1 at a peak count of fewer than 10 individuals; - Recorded in fewer than 10 FAS in Year 2 at a peak count of 28 individuals - Lesser black-backed gull - Recorded in 14 FAS in Year 1 at a peak count of 27 individuals; - Recorded in fewer than 10 FAS in Year 2 at a peak count of 10 individuals.



Species/Site	Conservation status	IOF	Rationale
			Gull species have not been considered IOFs as flights were mainly associated with Carron Valley Reservoir and gull species are considered to show high levels of avoidance to wind farms (NatureScot, 2025e). In addition, there is no suitable foraging habitat within the Site and so no habitat loss or displacement/disturbance is expected from the Proposed Development. Furthermore, there are no SPAs designated for gull species 20km of the Proposed Development. It is not predicted that any significant effects will occur to these species.
Marsh harrier	BoCC5 Amber List, Schedule 1 Annex 1, Scottish Biodiversity List NatureScot priority species for assessment	No	Marsh harrier is an amber-listed species in the UK and is listed on Annex 1 of the EU Bird Directive, Schedule 1 of the Wildlife and Countryside Act 1981, and the SBL. The most recent population estimate for breeding marsh harrier in Scotland was 19 pairs in 2022 (Peniche <i>et al.</i>, 2025). In addition, there is an estimated 10-100 birds during spring passage and 10-40 birds during autumn passage (Forrester <i>et al.</i>, 2012). The latest UK breeding population estimate in 2016 was 590-695 pairs (Woodward <i>et al.</i>, 2020). There is no current NHZ 17 breeding population estimate for this species. Two flights were recorded for a single juvenile marsh harrier passing through during an August survey in Year 2 FAS (2023), although no breeding territories were identified. Marsh harrier has not been considered an IOF due to the low levels of activity within and adjacent to the Site. It is not predicted that any significant effects will occur to this species.
Hen harrier	BoCC5 Red List, Schedule 1 Annex 1, Scottish Biodiversity List NatureScot priority species for assessment	No	Hen harrier is a red-listed species in the UK and is listed on Annex 1 of the EU Bird Directive, Schedule 1 of the Wildlife and Countryside Act 1981, and the SBL. The 2023 Scottish breeding population estimate was 529 pairs, with 1050-1450 individuals in winter (Peniche <i>et al.</i>, 2025; Forrester <i>et al.</i>, 2012), while the UK breeding population estimate was 691 pairs (RSPB; 2023). The latest breeding population estimate for this species in NHZ 17 was eight pairs (Wilson <i>et al.</i>, 2015). A single flight was recorded during the non-breeding season in Year 1 FAS (2022) and a single male was recorded during the Breeding Raptor Survey in 2022, although there was no evidence of a breeding territory in either survey year. Data provided by CRSG confirmed that there is no evidence that harrier nesting have ever bred within the Site or



Species/Site	Conservation status	IOF	Rationale
			adjacent area. Hen harrier has not been considered an IOF due to the low levels of activity within and adjacent to the Site. It is not predicted that any significant effects will occur to this species.
Merlin	BoCC5 Red List, Schedule 1 Annex 1, Scottish Biodiversity List NatureScot priority species for assessment	No	Merlin is a red-listed species in the UK and is listed on Annex 1 of the EU Bird Directive, Schedule 1 of the Wildlife and Countryside Act 1981, and the SBL. The 2008 Scottish breeding population estimate was 733 pairs (Ewing <i>et al.</i>, 2011; Peniche <i>et al.</i>, 2025), while the UK breeding population estimate was 890-1,450 pairs (2016; Woodward <i>et al.</i>, 2020). The breeding population estimate for this species in NHZ 17 was a single pair (Wilson <i>et al.</i>, 2015). A single individual flight was recorded hunting in August 2023 during Year 2 FAS. No breeding territories were identified. Merlin has not been considered an IOF due to the low levels of activity within and adjacent to the Site. It is not predicted that any significant effects will occur to this species.
Crossbill (<i>Loxia curvirostra</i>)	BoCC5 Green List, Schedule 1	No	Crossbill is a green-listed species of conservation concern in the UK and is a Schedule 1 species (Stanbury <i>et al.</i>, 2021). This species was recorded occasionally during Year 1 MBBS, with one potential territory identified. However, MBBS are not designed to recorded breeding passerines and it is likely that additional breeding territories are present within the Site and wider area. Further detail regarding breeding crossbill is provided in Technical Appendix 9.2: Confidential Annex. Crossbill has not been considered an IOF due to NatureScot guidance indicating that the impacts on passerine species are minimal (NatureScot, 2025). It is not predicted that any significant effects will occur to this species.



Valuation of IOFs Scoped into the Assessment

9.6.2 IOFs scoped into the assessment are listed below, alongside their importance.

- IOFs of national importance;
 - Nightjar; and
 - Osprey.
- IOFs of regional importance;
 - Greylag goose;
 - Pink-footed goose;
 - Oystercatcher;
 - Lapwing;
 - Curlew;
 - Snipe;
 - Goshawk;
 - Red kite; and
 - Peregrine.

Elements Scoped out of Assessment

- 9.6.3 Bird species considered to be of local or lower importance have not been defined as IOFs and have been scoped out of the assessment. The ornithological assessment has concluded that the Proposed Development would not result in any significant ornithological effects, but nonetheless, the embedded and standard mitigation measures described below would be followed and will ensure compliance with the nature conservation legislation. Furthermore, measures to benefit biodiversity will need to be delivered as part of the project to satisfy the National Planning Framework 4 (NPF4).
- 9.6.4 *Embedded Mitigation* and Standard Mitigation would be implemented to ensure that potential impacts to all breeding species, including those of local importance, are minimised.
- 9.6.5 Impacts on designated sites outwith 20km of the Proposed Development were scoped out of the assessment based on NatureScot connectivity guidance (NatureScot, 2016). Impacts on all designated sites within 20km were scoped out at Scoping as there is little to no connectivity to these sites, as outlined in **Table 9-7**.
- 9.6.6 Wind turbine delivery is not anticipated to have any impacts on the ornithological receptors as there is no pathway for effects and therefore has been scoped out of the assessment.

Scope of Assessment Summary

- 9.6.7 A summary of the elements scoped into and out of the assessment is presented below in **Table 9-8**.



Table 9-8: Summary of Assessment Scope

Receptor/Impact	Scoped In?		Comments
	Construction	Operation	
Collision mortality			
Osprey, greylag goose, pink-footed goose	No	Yes	Sufficient importance to be considered as an IOF with a level of flight activity and risk to be scoped-in to modelling.
All other species	No	No	Not an IOF species, or a species where flight activity is so low that there is negligible collision risk and was therefore scoped out of CRM with no potential for significant effects.
Disturbance/displacement			
Osprey, greylag goose, pink-footed goose, lapwing, curlew, oystercatcher, snipe, goshawk, red kite, peregrine	Yes	Yes	IOF species breeding or foraging in proximity to turbines and infrastructure, therefore there is the potential for disturbance/displacement.
All other species	No	No	Not an IOF species, or a species where activity within the Site is so low that there is negligible disturbance/displacement risk.
Habitat loss			
Osprey, greylag goose, pink-footed goose, lapwing, curlew, oystercatcher, snipe, goshawk, red kite, peregrine	Yes	No	IOF species breeding or foraging in proximity to turbines and infrastructure, therefore there is the potential for loss of suitable habitat.
All other species	No	No	Not an IOF species, or a species for which there is no suitable habitat within the Site.
Barrier effects			
Osprey, greylag goose, pink-footed goose	No	Yes	IOF species commuting between roosting and foraging grounds through turbines and infrastructure, therefore there is the potential for restricted access via barrier effects and the associated additional energy expenditure.
Decommissioning			
All receptors	No	No	A Decommission and Restoration Plan (“DRP”) would be prepared prior to decommissioning and would reflect the baseline conditions and best practice current at the time of decommissioning and restoration. Further detail is included in the Technical Appendix 9.2: Scoping Report .



Decommissioning

- 9.6.8 As described in **Chapter 3: Description of the Development**, effects associated with the construction phase can be considered to be representative of reasonable worst-case decommissioning effects. Furthermore, as decommissioning will take place more than 40 years from the baseline surveys, it is likely the baseline conditions during decommissioning will be significantly altered, and therefore it is considered unsuitable to assess the effects at this time. It is recommended that further surveys are undertaken prior to decommissioning to determine the potential effects on IOFs or any other notable species.

9.7 Assessment of Potentially Significant Effects

Species of National Importance

Nightjar

Construction

- 9.7.1 Nightjar typically breed in clear-fell forestry, including recently felled areas of forest, areas where significant re-growth has occurred, and stands of stunted trees (Shewring, 2022). Construction is likely to result in a loss of suitable breeding habitat for birds. There will be loss of 75.8ha of woodland, of which a small proportion would be suitable clear-fell or young growth forest suitable for breeding nightjar. Considering nightjar breeding habitat preferences, suitable habitat will change as forestry matures, whilst felling as part of forestry operations would create new habitat. Given that the quantity of suitable habitat that will be lost is very small and the availability of suitable alternate breeding habitat south of the reservoir, any indirect effects associated with habitat loss are likely minimal.
- 9.7.2 It is considered that there is potential to displace breeding nightjar from within 500m of works during the construction phase based on the stated disturbance distance in NatureScot guidance (Goodship and Furness, 2022). In this scenario there is the potential to displace, both territories identified by FLS in 2025. The construction phase is short-term in nature and any effects would be reversible.
- 9.7.3 The displacement of two nightjar territories would equate to 7.41% of the most recent Scottish population estimate of nightjar territories of 27 churring males in 2004 (Conway and Henderson, 2005). However, Cairnoch Hill is managed as an active forestry and as such, there is potential that nightjar may exhibit habitation to the forestry work which would be comparable to the construction phase. Furthermore, the two territories identified by FLS were within 200m of an existing forestry track and a road.
- 9.7.4 The only works within 500m of the nightjar records would be track upgrades, and therefore the potential for disturbance is limited, and not likely to be greater in magnitude than baseline forestry operations. Implementation of embedded mitigation measures would avoid disturbance if breeding was confirmed during the construction phase.
- 9.7.5 However, birds may choose not to breed as a result of ongoing construction work and therefore be displaced from the Site during the construction phase. If this was the case, there is suitable alternative nesting habitat available which could likely accommodate breeding birds, including forestry to the south of the reservoir.
- 9.7.6 Therefore, the impacts during the construction phase are considered to be **minor** and **not significant**.



Operation

- 9.7.7 In a worst-case scenario it is considered that there is potential to displace breeding nightjar from within 500m of works through infrequent human disturbance during maintenance in the operation phase based on the stated disturbance distance in NatureScot guidance (Goodship and Furness, 2022). In this scenario there is the potential to displace both territories identified by FLS in 2025.
- 9.7.8 The displacement of two nightjar territories would equate to 7.41% of the Scottish population of nightjar territories of 27 churring males in 2004 (Conway and Henderson, 2005). However, Cairnoch Hill is managed as an active forestry site and as such, it is likely that nightjar exhibit habituation to the forestry work which would be comparable to the operational phase of the Proposed Development. Furthermore, the two territories identified by FLS were within 200m of an existing forestry track and a road and therefore are likely habituated to this disturbance source.
- 9.7.9 There is little to no evidence for the displacement effects specific to operational wind turbines on nightjar. Therefore, it is considered that 500m is a suitable displacement distance to use (Goodship and Furness, 2022). In this scenario, no nightjar territories would be displaced as both territories are 1.1km from the proposed wind turbine locations.
- 9.7.10 Therefore, the potential impacts of disturbance and/or displacement during the operational phase are considered to be **negligible** and **not significant**.
- 9.7.11 There was no evidence from baseline surveys that nightjar regularly commuted through the Site, therefore there would be no barrier effect associated with the operational phase of the Proposed Development.
- 9.7.12 There is considered no significant collision risk effects associated with the Proposed Development as the species was not recorded during FAS. Although it is acknowledged that flight activity may be underestimated due to the crepuscular/nocturnal nature of this species, given breeding territories were all at least 500m from wind turbines the impacts of collision risk during the operational phase are **negligible** and **not significant**.

Osprey

Construction

- 9.7.13 Osprey typically breed in the tops of exposed trees or artificial nest platforms near bodies of water with sufficient prey resources (Saurola, 1997). Construction is likely to result in a loss of suitable breeding habitat for birds. There will be loss of 75.8ha of woodland, of which a small proportion would be mature trees suitable to support nesting. Given that the quantity of suitable habitat that would be lost is very small and the availability of suitable alternate breeding habitat any indirect effects associated with habitat loss are likely minimal. There would be no loss of foraging habitat.
- 9.7.14 It is considered that there is potential to displace breeding osprey from within 750m of works during the construction phase based on the stated disturbance distance in NatureScot guidance (Goodship and Furness, 2022). In this scenario there is the potential to displace one breeding pair of osprey during the construction phase. Details of the nest location are contained within **Technical Appendix 9.4: Additional Confidential Annex**. The construction phase is short-term in nature and any effects would be reversible.



- 9.7.15 The displacement of a single breeding pair of osprey equates to 20% of the NHZ 17 breeding population (five pairs) or 3.1% of the SRMS Central Region breeding population (32 occupied home ranges). It should be noted that the SRMS population does not include any non-breeding adult birds and therefore may be an underestimate. The SRMS Central Region population estimate is more recent than the NHZ population, and given the location of the Site which is at the north eastern edge of NHZ 17, it is considered that the SMRS population is likely more representative and accurate for the purposes of impact assessment.
- 9.7.16 Cairnoch Hill is managed as an active forestry and as such, there is potential that osprey may exhibit habitation to the forestry work which would be comparable to the construction phase. Implementation of embedded mitigation measures would avoid disturbance if breeding was confirmed during the construction phase.
- 9.7.17 However, birds may choose not to breed as a result of ongoing construction work, and therefore be displaced from the Site during the construction phase. If this was the case, there is suitable alternative nesting habitat available which could likely accommodate breeding birds, including forestry to the south of the reservoir.
- 9.7.18 Therefore, the impacts during the construction phase are considered to be **minor** and **not significant**.

Operation

- 9.7.18.1 It is considered that there is potential to displace breeding osprey from within 750m of works through infrequent human disturbance during maintenance in the operational phase (Goodship and Furness, 2022). Details of the nest location are contained within **Technical Appendix 9.4: Additional Confidential Annex**. In this scenario there is potential to displace one breeding pair of osprey during the operational phase. However, the core range of an osprey is 10km² and there is abundant alternate suitable breeding habitat present within the adjacent area. Furthermore, Cairnoch Hill is managed as an active forestry so breeding osprey may exhibit a level of habituation to disturbance.
- 9.7.18.2 There is little to no evidence for the displacement effects of operational wind turbines on osprey. Therefore, it is considered that 750m is a suitable displacement distance to use (Goodship and Furness, 2022). In this scenario, there is potential to displace one pair of osprey within 750m of proposed wind turbines during the operational phase.
- 9.7.19 The displacement of a single breeding pair of osprey equates to 20% of the NHZ 17 breeding population (five pairs) or 3.1% of the SRMS Central Region breeding population (32 occupied home ranges). It should be noted that these population estimates do not include any non-breeding adult birds, and therefore the population may be slightly greater.
- 9.7.20 Cairnoch Hill is managed as an active forestry and as such, there is potential that osprey may exhibit habitation to the forestry work which would be comparable to disturbance during the operational phase. Furthermore, within the Site and wider area there is an abundance of alternate habitat to accommodate displaced osprey.
- 9.7.21 Osprey show high nest site fidelity but are known to relocate when nests become damaged or are disturbed. There is evidence this occurs at Cairnoch Hill; data provided by CRSG showed pairs of osprey relocating short distances in the year following a failed breeding attempt, while the existing nest site has suffered from storm damage and predation. Therefore, the potential impacts of disturbance and/or displacement during the operational phase are considered to be **minor** and **not significant**.



- 9.7.22 One breeding pair of osprey were recorded north of the Proposed Development and were recorded frequently commuting between the nest site and Carron Valley reservoir. If osprey was to continue to use the traditional nest site, then there is the potential for barrier effects, while there is also collision risk due to flight activity close to wind turbine locations.
- 9.7.23 The Proposed Development could create a barrier effect and cause an increase of energy expenditure to navigate around the wind turbines. Considering the small size of the Proposed Development and the 10km² core foraging range of osprey, the increased energy expenditure to avoid the wind farm would likely be minor and is unlikely to impact on breeding success. Therefore, the impacts of a barrier effect during the operational phase are considered to be **negligible** and **not significant**.
- 9.7.24 Secondly, the osprey may commute through the turbines, which would result in collision risk. The CRM predicted an average annual collision risk of 2.571 collisions a year or one collision every 0.39 years, which equates to 102.823 collisions over the 40-year lifetime of the Proposed Development.
- 9.7.25 An average annual collision of 2.571 osprey represents 25.71% of the NHZ 17 breeding population of osprey of 5 breeding pairs (10 adults) recorded in 2013 or 4.02% of the SRMS Central Region breeding population (assuming 32 occupied home ranges and therefore a population of 64 birds). Therefore, in the absence of mitigation, potential collision risk effects on osprey during the operational phase are assessed as being of **moderate magnitude** and **significant**. As a result of the potential impacts on osprey, additional mitigation has been proposed for this species and is detailed in Additional Mitigation and Enhancement.

Species of Regional Importance

Greylag goose

Construction

- 9.7.26 Greylag goose forage in arable farmland and grassy fields (Strong *et al.*, 2021). Therefore, it is considered that no suitable foraging habitat would be lost during the construction phase.
- 9.7.27 As greylag goose was only recorded in short flights and not recorded breeding, there is no potential for displacement and/or disturbance during the construction phase.
- 9.7.28 Therefore, there will be **no impact** from habitat loss and displacement/disturbance and the effects are considered **not significant** during the construction phase.

Operation

- 9.7.29 As greylag goose was only recorded in flight over the Site and no breeding was recorded, there is no potential for displacement and/or disturbance. Therefore, there will be **no impact** from displacement/disturbance and the effects are considered **not significant** during the operational phase.
- 9.7.30 It is considered that a barrier effect from turbines is only significant within 1.5km from a SPA boundary, as birds are flying at an altitude where collision is possible, with barrier effects beyond this distance expected to be trivial (NatureScot, 2025f). There are no SPAs designated for greylag goose within 20km of the Proposed Development. Furthermore, whilst the possibility that some records of greylag goose on site refer to wild birds, many of the greylag goose records are thought to refer to individuals from feral populations. Therefore, the impacts of barrier effects during the operational phase are considered to be **negligible** and **not significant**.



- 9.7.31 The CRM predicted an annual average collision risk of 0.072 greylag goose or one collision every 13.85 years, which would equate to 2.889 collisions during the 40-year lifespan of the Proposed Development. As it could not be ruled out that greylag goose recorded during the survey programme were of wild origin, this species was included for CRM. However, is likely most, if not all, individuals recorded were of feral origin. Even if all collisions related to Icelandic birds, this would equate to <0.01% of the Scottish wintering population annually, therefore it is considered that the impact from collision risk is **negligible** and **not significant**.

Pink-footed goose

Construction

- 9.7.32 Pink-footed goose forage in arable farmland (Gill, 1996). Therefore, it is considered that no suitable foraging habitat would be lost during the construction phase.
- 9.7.33 As pink-footed goose was only recorded in flight, commuting through the Site, there is no potential for displacement and/or disturbance during the construction phase.
- 9.7.34 Therefore, there will be **no impact** from habitat loss displacement/disturbance and the effects are considered **not significant** during the construction phase.

Operation

- 9.7.35 As pink-footed goose was only recorded in flight and not recorded breeding, there is no potential for displacement and/or disturbance during the operational phase. Therefore, there will be **no impact** from displacement/disturbance and the effects are considered **not significant** during the operational phase.
- 9.7.35.1 It is considered that a barrier effect from turbines is only significant within 1.5km from a SPA boundary, as birds are flying at an altitude where collision is possible, with barrier effects beyond this distance expected to be trivial (NatureScot, 2025f). The nearest SPA designated for pink-footed goose is approximately 14.6km north-east of the Site. Therefore, the impacts of barrier effects during the operational phase are considered to be **negligible** and **not significant**.
- 9.7.35.2 The CRM predicted an annual average collision risk of 0.005 pink-footed goose or one collision every 209.76 years, which would equate to 0.191 collisions during the lifespan of the Proposed Development. A total annual collision risk of 0.005 birds represents < 0.01% of the NHZ 17 population of pink-footed goose. Therefore, the impacts of collision risk during the operational phase are **negligible** and **not significant**.

Waders (oystercatcher, lapwing, curlew, and snipe)

Construction

- 9.7.36 Oystercatcher typically forage and breed on a variety of habitats including beaches, saltmarshes, mudflats, agricultural, and grassland habitats (van de Pol *et al.*, 2014). Lapwing typically breed on open habitats such as unimproved grassland and arable farmland with a preference for nesting near damp areas (Galbraith *et al.* 1984; Berg *et al.*, 1992). Curlew typically breed on open, wet, moorland and show a strong avoidance for nesting near wooded areas (Rivers *et al.*, 2025). Snipe typically breed within wet or boggy habitats which provide optimal foraging habitat and require tussocky or rank vegetation (Newton, 2020).
- 9.7.37 Construction is not likely to result in a loss of suitable breeding habitat for any wader species, which were recorded breeding on the moorland outwith the Proposed Development detailed fully in **Technical Appendix 9.1: Baseline Reports**



- 9.7.38 However, construction is likely to result in a loss of a small quantity of suitable foraging habitat for waders (0.75 ha) Furthermore, it is unlikely that foraging waders would use this habitat area given its location, extent, and no birds were recorded in this area during baseline surveys. In addition, the quantity of suitable habitat that will be lost is very small, and there is suitable alternative habitat available in the wider area. Therefore, any indirect effects associated with habitat loss are likely minimal.
- 9.7.39 It is considered that there is potential to displace breeding waders during the construction phase based on the stated disturbance distance in NatureScot guidance (Goodship and Furness, 2022):
- Oystercatcher – 100m;
 - Lapwing – 500m (based on the disturbance distance for similar wader species (e.g. golden plover);
 - Curlew – 300m; and
 - Snipe – 100m (based on the disturbance distance for similar disturbance tolerant wader species (e.g. oystercatcher).
- 9.7.40 In this scenario, no pairs of oystercatcher, lapwing, and snipe were located within their respective disturbance distance of infrastructure, there is no potential for disturbance/displacement to arise during construction.
- 9.7.41 A single breeding pair could be displaced during the construction phase. The construction phase is short-term in nature and any effects would be reversible. The displacement of a single breeding pair would equate to < 0.1% of the NHZ 17 breeding population of 2,303 pairs. Implementation of embedded mitigation measures would avoid disturbance if breeding was confirmed during the construction phase. There is also suitable breeding habitat beyond 300m from Site infrastructure, as demonstrated by other territories recorded during MBBS, which could accommodate displaced birds.
- 9.7.42 Therefore, the impacts the construction phase are considered to be **no impact** or **negligible** and **not significant** for all wader species assessed.

Operation

- 9.7.43 It is considered that there is potential to displace breeding waders through infrequent human disturbance during maintenance in the operational phase based on the stated disturbance distance in NatureScot guidance (Goodship and Furness, 2022):
- Oystercatcher – 100m;
 - Lapwing – 500m (based on the disturbance distance for similar wader species (e.g. golden plover);
 - Curlew – 300m; and
 - Snipe – 100m (based on the disturbance distance for similar disturbance tolerant wader species (e.g. oystercatcher).
- In this scenario, no pairs of oystercatcher, lapwing, and snipe were located within their respective disturbance distance of infrastructure, there is no potential for disturbance/displacement to arise during operation.
- 9.7.44 A single breeding pair could be displaced during the operational phase. The construction phase is short-term in nature and any effects would be reversible. The displacement of a single breeding pair would equate to < 0.1% of the NHZ 17



breeding population of 2,303 pairs. Activity during the operational phase is likely to be limited in scale and magnitude and similar to the baseline disturbance associated with existing forestry. It is also likely that disturbance would be screened by forestry as wind turbines would be keyholed. Additionally, another pair of curlew were recorded within 100m of an existing road, and two pairs were recorded within 150m of access tracks through moorland indicating curlew may be habituated to a level of disturbance. There is also suitable breeding habitat beyond 300m from site infrastructure, as demonstrated by other territories recorded during MBBS, which could accommodate displaced birds.

- 9.7.45 Waders can be displaced by operational wind turbines, with the displacement distance varying by species. There is no stated disturbance distance for oystercatcher and lapwing from operational turbines within recent guidance. Therefore, the values stated in Goodship and Furness (2022) have been used (i.e. 100m and 500m for oystercatcher and lapwing respectively). However, no oystercatcher and lapwing were found within displacement distance of the proposed wind turbine locations.
- 9.7.46 There is mixed evidence that breeding curlew are displaced by operational wind turbines. A study by Pierce-Higgins *et al.* (2009) found that breeding curlew could be displaced from 800m by operational wind turbines. In this worst-case scenario, a total of three pairs of curlew could be displaced. However, a long-term monitoring study by Whitfield *et al.* (2010) reported no evidence that curlew were displaced by wind farm infrastructure.
- 9.7.47 This is supported by long-term post-construction monitoring at Causeymire Wind Farm, which found curlew within 500m of wind turbines suggesting curlew may tolerate operational wind farms. There is also suitable breeding habitat beyond 800m from Site infrastructure, as demonstrated by other territories recorded during MBBS, which could accommodate displaced birds. The loss of three pairs of curlew would equate to 0.1% of the NHZ 17 breeding population.
- 9.7.48 Evidence suggests that snipe are displaced by operational wind turbines, with one study finding that there is potential for 50% of breeding snipe within 400 m of wind turbines to be displaced (Pearce-Higgins *et al.*, 2009). However, no snipe were recorded breeding within 400 m of the wind turbines.
- 9.7.49 Therefore, the impacts of disturbance and/or displacement during the operational phase are considered to be **negligible** and **not significant**.
- 9.7.50 There was no evidence from baseline surveys that any wader species regularly commuted through the Site, therefore there would be no barrier effect for all wader species associated with the operational phase of the Proposed Development.
- 9.7.51 There is considered no significant collision risk effects associated with the Proposed Development as waders were very rarely recorded during FAS and therefore CRM was not undertaken for these species. Although it is acknowledged that snipe flight activity may be underestimated due to the crepuscular/nocturnal nature of this species, given breeding territories were all at least 400m from wind turbines and that there is very limited suitable habitat within the Site for this species the potential for collision risk is low. Therefore, the impacts of collision risk for all wader species during the operational phase are **negligible** and **not significant**.

Goshawk

Construction

- 9.7.52 Goshawk nest in a wide range of wooded habitats including conifer and mixed plantations (Petty, 1996). Construction is likely to result in a loss of suitable breeding



- habitat, with a total loss of 75.8 ha. Habitat loss is unlikely to impact on goshawk foraging resources, given impacts on passerines (favoured prey) are negligible. Given that the quantity of suitable habitat that will be lost is very small and suitable alternative habitat is available in the wider area any indirect effects associated with habitat loss are likely **negligible** and **not significant**.
- 9.7.53 It is considered that there is potential to displace breeding goshawk from within 500m of works during the construction phase (Goodship and Furness, 2022). In this scenario, there is potential for one breeding pair to be displaced during the construction phase. The construction phase is short-term in nature and any effects would be reversible.
- 9.7.54 The displacement of a single breeding pair of goshawk would equate to 20% of the NHZ 17 breeding population of five pairs (Wilson *et al.*, 2015) or 7.1% of the Central Region population (14 occupied home ranges). However, the potential territory identified within 500m of the Proposed Development was based on the finding of a goshawk feather in addition to recorded flights, and no nest was identified. It is therefore possible that birds may have nested beyond the 500m disturbance distance.
- 9.7.55 Data provided by Central Raptor Study Group (CRSG) showed that another potential goshawk territory was present on Cairnoch Hill within 500m of infrastructure in 2025, though no nest was found. Cairnoch Hill is managed as an active forestry and as such, there is potential that goshawk may exhibit habitation to the forestry work which would be comparable to the construction phase. Nonetheless, implementation of embedded mitigation measures would avoid disturbance if breeding was confirmed during the construction phase.
- 9.7.56 Therefore, the impacts during the construction phase are considered to be **minor** and **not significant**.

Operation

- 9.7.57 It is considered that there is potential to displace breeding goshawk from within 500m of infrastructure through infrequent human disturbance during maintenance in the operational phase (Goodship and Furness, 2022). In this scenario, there is potential for one breeding pair to be displaced during the operational phase. The displacement of a single breeding pair of goshawk would equate to 20% of the NHZ 17 breeding population of five pairs (Wilson *et al.*, 2015) or 7.1% of the Central Region population (14 occupied home ranges).
- 9.7.58 However, the potential territory identified within 500m of the Proposed Development was based on the finding of a goshawk feather and no nest was identified. Data provided by CRSG showed that a potential goshawk territory was present on Cairnoch Hill within 500m of infrastructure in 2025. The locations of the potential territory identified during Breeding Raptor Surveys and provided by CRSG are both within 150m of existing access tracks for commercial forestry that occurs at the Site, which suggests may be habituated to existing levels of disturbance from forestry work. In addition, pairs of goshawk can use alternative nesting areas up to 2.5km should disturbance occur.
- 9.7.59 There is potential for displacement of goshawk from around operational wind turbines but no relevant literature for goshawk could be found. Therefore, it is considered that using the 500m breeding season buffer outlined in Goodship and Furness (2022) is appropriate. No goshawk breeding territory identified during the Breeding Raptor Survey or provided by CRSG was located within 500m of a proposed turbine location. Therefore, the impacts of disturbance and/or



displacement during the operational phase are considered to be **minor** and **not significant**.

- 9.7.60 There was no evidence from baseline surveys that goshawk regularly commuted through the Site. All goshawk territories identified (including those by CRSG) were recorded south of the wind turbines, which is where there is a greater forest area, there would be no barrier effect considered.
- 9.7.61 There is considered no significant collision risk effects associated with the Proposed Development as the species was recorded very rarely in FAS and therefore CRM was not undertaken for this species. The impacts of collision risk during the operational phase are **negligible** and **not significant**.

Red kite

Construction

- 9.7.62 Red kite typically breed in mature woodland in trees at heights of 4-30m (Carter and Grice, 2000). Construction is likely to result in a loss of suitable breeding habitat for birds, with a total loss of 75.8 ha. Given that the quantity of suitable habitat that will be lost is very small and suitable alternative habitat is available in the wider area any indirect effects associated with habitat loss are likely minimal.
- 9.7.63 It is considered that there is potential to displace breeding red kite from within 300m of works during the construction phase (Goodship and Furness, 2022). In this scenario, there is potential for one breeding pair to be displaced during the construction phase. The construction phase is short-term in nature and any effects would be reversible.
- 9.7.64 The displacement of a single breeding pair of red kite would equate to 100% of the NHZ 17 breeding population of 0 pairs (Wilson *et al.*, 2015) However, it must be noted that the inclusion of this territory was precautionary, and no breeding evidence was confirmed. The national red kite population has also increased significantly in Scotland, with the Raptor Study Group stating that the number of breeding pairs has doubled every four to six years (Raptor Study Group, 2026). The SRMS estimated a population of 24 red kite pairs (occupied home ranges) in the Central Region, which includes the Site. The displacement of a single breeding pair of red kite would equate to 4.1% of the Central Region population. It should be noted that the SRMS population does not include any non-breeding adult birds and therefore the population may be an underestimate. As per NatureScot's request during consultation, the NHZ 17 population is considered for the assessment.
- 9.7.65 Cairnoch Hill is managed as an active forestry and as such, there is potential that red kite may exhibit habitation to the forestry work which would be comparable to the construction phase. Nonetheless, implementation of embedded mitigation measures would avoid disturbance if breeding was confirmed during the construction phase.
- 9.7.66 Therefore, the impacts during the construction phase are considered to be **minor** and **not significant**.

Operation

- 9.7.66.1 It is considered that there is potential to displace breeding red kite from within 300m of works through infrequent human disturbance during maintenance in the operational phase (Goodship and Furness, 2022). In this scenario, there is potential for one breeding pair to be displaced during the operational phase.



- 9.7.66.2 The displacement of a single breeding pair of red kite would equate to 100% of the NHZ 17 breeding population of 0 pairs (Wilson *et al.*, 2015) or 4.1% of the Central Region monitored by the SRMS. However, it must be noted that the inclusion of this territory was precautionary, and no breeding evidence was confirmed. Cairnoch Hill is managed as an active forestry and as such, there is potential that red kite may exhibit habitation to the forestry work which would be comparable to the operational phase
- 9.7.67 There is potential for displacement of red kite from around operational wind turbines but no relevant literature for red kite could be found. Therefore, it is considered that using the 300m breeding season buffer outlined in Goodship and Furness (2022) is appropriate. No red kite breeding territory identified during the Breeding Raptor Survey or provided by CRSG was located within 500m of a proposed wind turbine location.
- 9.7.68 Therefore, the impacts of disturbance and/or displacement during the operational phase are considered to be **negligible** and **not significant**.
- 9.7.69 There was no evidence from baseline surveys that red kite regularly commuted through the Site, therefore there would be no barrier effect associated with the operational phase of the Proposed Development.
- 9.7.70 There is considered no significant collision risk effects associated with the Proposed Development as the species was recorded rarely in FAS and therefore CRM was not undertaken for this species. The impacts of collision risk during the operational phase are **negligible** and **not significant**.

Peregrine

Construction

- 9.7.71 Peregrine typically breed on coastal or inland cliffs, typically above a river or loch, though this species will breed on heather slopes, man-made structures, and nests of other raptor species (Ratcliffe, 1993; Ratcliffe, 1994; Harwood, 2000). Construction is unlikely to result in a loss of suitable foraging and breeding habitat for birds. Given that the quantity of suitable habitat that will be lost is very small and suitable alternative habitat is available in the wider area any indirect effects associated with habitat loss are likely minimal.
- 9.7.72 It is considered that there is potential to displace breeding peregrine from within 750m of works during the construction phase (Goodship and Furness, 2022). In this scenario, no breeding pairs would be displaced during the construction phase.
- 9.7.73 Therefore, the impacts during the construction phase are considered to be **negligible** and **not significant**.

Operation

- 9.7.74 It is considered that there is potential to displace breeding peregrine from within 750m of works through infrequent human disturbance during maintenance in the operational phase (Goodship and Furness, 2022). In this scenario, no breeding pairs would be displaced during the operational phase. There is potential for displacement of peregrine from around operational turbines but no relevant literature for peregrine could be found. Therefore, it is considered that using the 750m breeding season buffer outlined in Goodship and Furness (2022) is appropriate. No peregrine breeding territory was located within 750m of a proposed wind turbine location and there are no disturbance/displacement effects predicted.



9.7.75 There was no evidence from baseline surveys that peregrine regularly commuted through the Site, therefore there would be no barrier effect associated with the operational phase of the Proposed Development.

9.7.76 There is considered no significant collision risk effects associated with the Proposed Development as the species was recorded rarely in FAS and therefore CRM was not undertaken for this species. The impacts of collision risk during the operational phase are **negligible** and **not significant**.

9.8 Additional Mitigation and Enhancement

9.8.1 **Table 9-9** sets out additional mitigation measures (also known as Secondary Mitigation, comprising measures beyond embedded/standard mitigation) and enhancement measures to which the Applicant has committed. These measures are designed to reduce identified adverse effects and/or to enhance beneficial effects.

Table 9-9: Additional (Secondary) Mitigation and Enhancement

Reference	Mitigation/ Enhancement Measure	Description
Additional mitigation		
	Osprey Nest Modification	To minimise disturbance/displacement and collision risk to osprey breeding north of the proposed turbine locations, the current nest will be felled, following initial acceptance of the proposed approach with NatureScot during consultation but subject to their final agreement . It is recommended that if osprey was to nest during the operational phase that NatureScot are consulted and the nest removed during the non-breeding season if considered to be at increased risk of collision.
Enhancement		
	Native Woodland Restoration	The Site is primarily comprised of non-native conifer, which has low biodiversity value. The closed-canopy conifers will be converted into open canopy mixed woodland that will support a greater diversity of bird species. There may be some loss of habitat for breeding crossbill but this is considered negligible due to availability of conifer plantation within the Site and the wider area. Further details are presented in Technical Appendix 8.6 Outline Habitat Management Plan .
	Provision and maintenance of wildlife boxes	Provision of breeding boxes for birds will provide shelter and breeding space in areas where tree felling and habitat restoration will occur. Further details are presented in Technical Appendix 8.6 Outline Habitat Management Plan .
	Osprey Artificial Nesting Platforms	At least one artificial nest platform will be constructed away from the Proposed Development to compensate the loss of the nest pre-construction and reduce potential impacts. The plan will be finalised following further consultation with NatureScot and the location of the platform(s) will be confirmed with FLS. Further details are presented in Technical Appendix 8.6 Outline Habitat Management Plan .



9.9 Residual Effects

Construction

- 9.9.1 Following the implementation of embedded mitigation measures (Section 9.5 Embedded and Standard Mitigation), no significant effects on any IOFs during the construction phase of the Proposed Development are predicted.

Operation

- 9.9.2 With the exception of osprey for which the measures are covered in Section 9.8 Additional Mitigation and Enhancement, following the implementation of embedded mitigation measures, **no significant effects** on any IOFs during the operational phase are predicted. Furthermore, following the implementation of the Outline Habitat Management Plan (**Technical Appendix 8.6**), it is expected that there will be beneficial residual effects to some IOFs.
- 9.9.3 It is considered that there is potential for the collision risk to osprey to be significant. This was identified as a constraint at an early stage and was considered during design, however collision risk remains potentially significant pre-mitigation, and therefore specific mitigation and enhancement for osprey is proposed.
- 9.9.4 A large number of osprey flights recorded during FAS were related to birds foraging over the reservoir or were attributed to the pair of breeding osprey and associated with the nest site. In order to reduce collision risk, it is proposed that the existing nest site is removed and alternative nest platforms are erected in locations suitable for breeding beyond 500m from turbine locations and therefore collision risk would be greatly reduced. This approach has been agreed in consultation with NatureScot.
- 9.9.5 It should be noted that the existing nest site has been unproductive, having been damaged by recent storms and suffering nest predation, with no breeding during the 2026 breeding season. There is suitable alternative habitat for breeding osprey, and erection of platforms would provide a stable nest site less susceptible to predation.
- 9.9.6 To estimate collision risk following mitigation, additional CRM was undertaken removing flights which are associated with the existing nest site which would be removed. To account for this, CRM for osprey was re-run after removing flights associated with the nest. This scenario is considered more representative of operational phase following mitigation proposed for osprey (further detailed in Section 9.8 Additional Mitigation and Enhancement). The results of the second CRM scenario predicted an annual average collision risk of 0.876 osprey (**Table 9-10**).

Table 9-10: Updated Annual Osprey Collisions Following Additional Mitigation

Species	NatureScot avoidance rates	Predicted collisions per breeding season**	Predicted collisions per non-breeding season	Predicted annual collisions***	Predicted years per collision	Predicted collisions during Proposed Development operational lifespan (40 years)
Osprey	98.0%	0.876	0.000	0.876	1.017	35.040



- 9.9.7 Although flights associated with the existing nest have been removed when undertaking additional CRM, it is likely that the collision risk has still been overestimated following implementation of mitigation. A limitation of undertaking CRM assuming removal of the nest site is reliance on flight activity data collected when osprey were nesting. A precautionary approach was taken when scoping-out flights and it is likely that some flights included in modelling were associated with the existing nest site. Implementation of mitigation would fundamentally alter flight activity and it is likely that activity would be greatly reduced in comparison to the baseline, in turn reducing collision risk.
- 9.9.8 An annual predicted 0.876 osprey collisions represents 8.76% of the NHZ 17 breeding population of osprey of 5 breeding pairs (10 adults) recorded in 2013 or 1.37% of the SRMS Central Region breeding population (assuming 32 occupied home ranges and therefore a population of 64 birds). As detailed previously it is considered that the SRMS population is more appropriate due to the recency of the population estimate and the location of the site in respect of the NHZ.
- 9.9.9 The UK osprey population has increased in recent years, which is an amber-listed bird of conservation concern which was formerly red-listed (Stanbury *et al.*, 2021). Osprey is amber-listed due to its UK-wide breeding rarity and historical decline and recovery; however it should be noted that in Scotland the osprey population is much larger (229 pairs in 2021 [Peniche *et al.*, 2025]) than in England and Wales and is now a widespread and relatively common breeding species.
- 9.9.10 Artificial nest platforms are a common method to facilitate breeding osprey. Platforms have been used successfully across the globe in places such as Scotland, Wales, and the United States, with osprey rapidly relocating to the newly constructed nest sites. Furthermore, there is evidence that demonstrates that osprey breeding on artificial nest structures can have less variance in breeding success and, in some instances, higher productivity rates than those breeding at natural sites.
- 9.9.11 Acknowledging the increasing number of osprey in Scotland, with the SRMS Central population likely an underestimate with the exclusion of non-breeding adults, and that predicted collisions following mitigation are likely to have been overestimated, it is considered that following mitigation impacts on osprey would be **minor** and **not significant**.

9.10 Cumulative Assessment

- 9.10.1 Potential cumulative effects can include direct habitat loss, disturbance/displacement, barrier effects and collision risk. The potential for the Proposed Development to make a material contribution to cumulative effects on IOFs is assessed below following NatureScot (2025c) guidance.

Onshore Wind Developments

- 9.10.2 A search was made for onshore wind developments (either operational or consented) within 20km of the Proposed Development, with 20km representing the greatest connectivity distance relevant to the Proposed Development for a single species, as outlined in NatureScot guidance (NatureScot, 2016). These could result in cumulative effects on IOFs. The following sites within 20km were identified (**Table 9-11** Table 9-11).



Table 9-11 Wind farms within 20km of the Proposed Development

Wind Farm Name	Number of Turbines	Distance and Direction from Proposed Development Site Boundary	Status	Species assessed*
Craigannet	1	0.1km east	Operational	Unavailable
Earlsburn	15	0.4km north	Operational	Red kite, osprey, peregrine , merlin, short-eared owl, hen harrier
Craigengelt	8	0.4km east	Operational	Greylag goose , hen harrier, red kite , rough-legged buzzard, merlin, peregrine , golden plover, black grouse
Shelloch	5	1.6km north west	Consented	Black grouse, greylag goose, curlew , hen harrier, herring gull, osprey, red kite , short-eared owl
Drummarnock	4	1.6km east	Application	Curlew , short-eared owl, kestrel
Kingsburn (Earlsburn North)	9	2.1km north	Operational	Red kite, osprey, peregrine , merlin, short-eared owl, hen harrier
Earlsburn Avenue (Earlsburn Extension)	7	3.1km north	Consented	Greylag goose, pink-footed goose, osprey, goshawk , common gull, hen harrier, lesser black-backed gull, red kite, curlew , merlin, peregrine
Durrieshill	1	9.2km east	Operational	Unavailable
Tod Hill	4	12.1km east	Operational	Pink-footed goose, lapwing
Rosehill Farm	3	14.3km east	Operational	Pink-footed goose
Bellstane Farm	1	14.4km south	Operational	Unavailable
Bartlett Factory	1	16.9km south	Consented	Unavailable
Easter Glentore	1	16.9km south east	Operational	Unavailable



Wind Farm Name	Number of Turbines	Distance and Direction from Proposed Development Site Boundary	Status	Species assessed*
Greengairs (East)	8	17.2km south east	Operational	Whooper swan, pink-footed goose
Greendykeside	2	17.3km south east	Operational	Unavailable
Braidenhill Farm	1	17.5km south	Operational	Unavailable
Greenraig	1	18.9km east	Operational	Unavailable
* Species in bold are those assessed within this chapter				

9.10.3 A search was made for the EIA Reports for each site listed in **Table 9-11**, however not all documents related to the operational wind farms were available and therefore it was not possible to undertake a full quantitative cumulative impact assessment.

Cumulative Habitat Loss

9.10.4 The total habitat loss associated with the Proposed Development is 77.51ha, however some of this will be short-term as 41.4ha of woodland will be restocked after construction. There will be a loss of 31.22ha of non-native conifers associated with the active forestry. The habitat loss is considered minimal in the context of the overall extent of these habitats in the wider area.

9.10.5 Furthermore, habitat loss will be offset by the proposed habitat restoration (including native woodland, riparian zones, and peatland restoration). The restoration of native woodland includes mixed plantation of conifer and broadleaf tree species, which are suitable breeding habitat for tree-nesting raptors such as goshawk. The restoration of peatland has the potential to host breeding waders such as snipe and curlew, which were not recorded breeding in these areas. Therefore, it is considered likely there will be long-term benefits for breeding IOFS and as such the effects of cumulative habitat loss are considered habitat loss are considered to be **negligible** and **not significant**.

Cumulative Disturbance/Displacement

9.10.6 Following embedded mitigation, outlined in Section 9.5 Embedded and Standard Mitigation, disturbance effects are predicted to be of negligible magnitude for all IOFs and considered short-term during the construction phase. Assessments of breeding wader displacement are based on a worst-case scenario and may therefore represent an overestimate of the impact. As the potentially impacted wader territories are found on moorland on the very edge of the Site, it is likely that displaced will return to breed on the wider moorland. The inclusion of goshawk, red kite, and peregrine territories was precautionary and no breeding evidence was found. Regardless, Cairnoch Hill is managed as an active forestry and therefore birds breeding in the area may exhibit habituation to disturbance at the Site during the construction phase so may not be displaced. This is particularly relevant for species such as curlew that were recorded breeding closer to existing infrastructure than to the Proposed Development.

9.10.7 The number of birds annual displaced by the projects with connectivity to the site will be small and represent only a minimal proportion of the regional populations.



Therefore, it is considered that the effects of cumulative displacement/disturbance are **negligible** and **not significant**.

Cumulative Barrier Effects

- 9.10.8 Barrier effects have been considered for greylag goose, pink-footed goose, and osprey as these species were identified commuting during baseline surveys and therefore potentially susceptible to barrier effects associated with the Proposed Development
- 9.10.9 It is considered that a barrier effect for greylag and pink-footed goose from turbines is only significant within 1.5km from a SPA boundary, as birds are flying at an altitude where collision is possible, with barrier effects beyond this distance expected to be trivial (NatureScot, 2025f). The Proposed Development and projects with connectivity to the Site are all outwith 1.5km any SPA designated for either goose species. Therefore, the effects of cumulative barrier effects are **negligible** and **not significant**.
- 9.10.10 Given the large core foraging range of osprey, extending up to 10km from the nest, the Proposed Development, in combination with other projects, would occupy only a small proportion of this available foraging area and would not restrict access to key foraging habitats or create a substantial barrier to movement. Any localised avoidance of turbines is unlikely to result in a meaningful increase in flight distance or energetic expenditure, with suitable alternative flight routes remaining available across the wider landscape. Therefore, the effects of cumulative barrier effects are **negligible** and **not significant**.

Cumulative Collision Risk

- 9.10.11 The assessment of cumulative collision risk was based on wind farms at all stages of development within 20km of the Proposed Development (**Table 9-12**).
- 9.10.12 When considering pink-footed goose, the predicted annual collisions for the developments with potential connectivity and the Proposed Development is 3.975 birds. This represents 0.02% of the NHZ 17 population of 16,237 of pink-footed goose (Wilson *et al.*, 2015). Therefore, it is considered that the combined collision effect on pink-footed goose is **negligible** and **not significant**.
- 9.10.13 When considering greylag goose, the predicted annual collisions for the developments with connectivity and the Proposed Development is 3.109 birds. Given that it is likely that most of the flights involved individuals from feral populations, it is considered that the combined collision effects on greylag goose is **negligible** and **not significant**.
- 9.10.14 Following additional mitigation outlined in **Technical Appendix 8.6: Outline Habitat Management Plan**, there is likely to be a negligible or beneficial residual effect for osprey. The predicted average annual collision risk from developments with connectivity to the Site is 0.267 osprey per year. It must be noted that the relevant documents for Earlsburn, Earlsburn North, and Earlsburn Extension Wind Farms state that the CRM output for the developments are likely an overestimate based on osprey foraging over a reservoir that is within the CRZ and as such the impact to osprey was deemed to be not significant.
- 9.10.15 When the impact from other developments is added to the impact of 0.876 from the Proposed Development following additional mitigation, this results in a cumulative impact of 1.143 osprey. The potential collision risk of 1.43 osprey would represent > 10% of the NHZ 17 population (Wilson *et al.*, 2015) or 1.786% of the SRMS Central Region breeding population (assuming 32 occupied home ranges and therefore a population of 64 birds). As detailed previously it is considered that the



SRMS population is more appropriate due to the recency of the population estimate and the location of the site in respect of the NHZ, and the SRMS population is likely a slight underestimate.

- 9.10.16 As stated in **9.9 Residual Effects**, the Scottish osprey population is stable and growing, and the collision risk from the Proposed Development in isolation is likely an overestimate. In the context of this, additive annual collisions of 0.267 osprey (again likely an overestimate) it is considered that cumulative collision risk would remain **minor** and **not significant**.

Table 9-12: Cumulative collision risk for greylag goose, pink-footed goose, and osprey.

Wind Farm	Avoidance rate (%)	Collisions per year	Years per collision	Total over lifespan of wind farm	Combined collisions per year	Combined years per collision
Greylag goose						
Earlsburn Avenue (Extension)	99.8	0.000-0.120	8.510-684.35	0.060-4.700*	3.109	0.322
Craigengelt	95.0	2.900	0.340	72.500**		
Shelloch	98.0	0.017	60.000	0.504***		
The Proposed Development	99.8	0.0720	13.850	2.889		
Pink-footed goose						
Earlsburn Avenue (Extension)	99.8	0.060-0.570	1.74-903.38	2.590-22.990*	3.975	0.252
Greengairs	99.8	0.000	-	0.000**		
Rosehill Farm	99.0	2.400	0.420	54.000**		
Tod Hill	99.0	1.000	1.000	25.000**		
The Proposed Development	99.8	0.005	209.76	0.191		
Osprey						
Earlsburn	98.0	0.003	367.6	0.068**	1.143	0.875
Earlsburn North (Kingsburn)	98.0	0.085	11.8	2.125**		



Wind Farm	Avoidance rate (%)	Collisions per year	Years per collision	Total over lifespan of wind farm	Combined collisions per year	Combined years per collision
Earlsburn Avenue (Extension)	98.0	0.090-0.160	6.23-10.56	3.790-6.420*		
Shelloch	98.0	0.019	53	0.570***		
The Proposed Development	98.0	0.876	1.142	35.040		
*over 40-year lifespan						
**over 25-year lifespan						
***over 30-year lifespan						

9.11 Summary and Statement of Significance

- 9.11.1 An assessment has been made of the potential significant effects of the Proposed Development on IOFs. By implementing the embedded mitigation measures during the construction phase, the significance of effects on IOFs both alone and in combination with other schemes are assessed as **not significant (Table 9-13)**.



Table 9-13: Summary Table

IOF Species	Potential Effect	Mitigation/Enhancement Measure(s)	Significance of Residual Effect	
			Level and Significance	Beneficial/ Adverse
During Construction (& Decommissioning)				
Nightjar	Habitat loss	Implementation of OHMP	Negligible and Not Significant	Adverse
	Displacement/disturbance	Embedded mitigation	Negligible and Not Significant	Adverse
Osprey	Habitat loss	Implementation of OHMP	Negligible and Not Significant	Adverse
	Displacement/disturbance	Embedded mitigation	Negligible and Not Significant	Adverse
Greylag goose	Habitat loss	Implementation of OHMP	No Effect	-
	Displacement/disturbance	Embedded mitigation	No Effect	-
Pink-footed goose	Habitat loss	Implementation of OHMP	No Effect	-
	Displacement/disturbance	Embedded mitigation	No Effect	-
Oystercatcher	Habitat loss	Implementation of OHMP	Negligible and Not Significant	Adverse
	Displacement/disturbance	Embedded mitigation	Negligible and Not Significant	Adverse
Lapwing	Habitat loss	Implementation of OHMP	Negligible and Not Significant	Adverse
	Displacement/disturbance	Embedded mitigation	Negligible and Not Significant	Adverse
Curlew	Habitat loss	Implementation of OHMP	Negligible and Not Significant	Adverse



IOF Species	Potential Effect	Mitigation/Enhancement Measure(s)	Significance of Residual Effect	
			Level and Significance	Beneficial/ Adverse
	Displacement/disturbance	Embedded mitigation	Negligible and Not Significant	Adverse
Snipe	Habitat loss	Implementation of OHMP	Negligible and Not Significant	Adverse
	Displacement/disturbance	Embedded mitigation	Negligible and Not Significant	Adverse
Goshawk	Habitat loss	Implementation of OHMP	Negligible and Not Significant	Adverse
	Displacement/disturbance	Embedded mitigation	Negligible and Not Significant	Adverse
Red kite	Habitat loss	Implementation of OHMP	Negligible and Not Significant	Adverse
	Displacement/disturbance	Embedded mitigation	Negligible and Not Significant	Adverse
Peregrine	Habitat loss	Implementation of OHMP	Negligible and Not Significant	Adverse
	Displacement/disturbance	Embedded mitigation	Negligible and Not Significant	Adverse
During Operation				
Nightjar	Displacement/disturbance	Embedded mitigation	Negligible and Not Significant	Adverse
	Barrier effects	Embedded mitigation	Negligible and Not Significant	Adverse
Osprey	Displacement/disturbance	Embedded mitigation	Minor and Not Significant	Adverse



IOF Species	Potential Effect	Mitigation/Enhancement Measure(s)	Significance of Residual Effect	
			Level and Significance	Beneficial/ Adverse
	Barrier effects	Embedded mitigation	Negligible and Not Significant	Adverse
	Collision risk	Additional mitigation	Minor and Not Significant	Adverse
Greylag goose	Displacement/disturbance	Embedded mitigation	No Effect	-
	Barrier effects	Embedded mitigation	Negligible and Not Significant	Adverse
	Collision risk	-	Negligible and Not Significant	Adverse
Pink-footed goose	Displacement/disturbance	Embedded mitigation	No Effect	
	Barrier effects	Embedded mitigation	Negligible and Not Significant	Adverse
	Collision risk	-	Negligible and Not Significant	Adverse
Oystercatcher	Displacement/disturbance	Embedded mitigation	Negligible and Not Significant	Adverse
	Barrier effects	Embedded mitigation	Negligible and Not Significant	Adverse
Lapwing	Displacement/disturbance	Embedded mitigation	Negligible and Not Significant	Adverse
	Barrier effects	Embedded mitigation	Negligible and Not Significant	Adverse
Curlew	Displacement/disturbance	Embedded mitigation	Negligible and Not Significant	Adverse
	Barrier effects	Embedded mitigation	Negligible and Not Significant	Adverse



IOF Species	Potential Effect	Mitigation/Enhancement Measure(s)	Significance of Residual Effect	
			Level and Significance	Beneficial/ Adverse
Snipe	Displacement/disturbance	Embedded mitigation	Negligible and Not Significant	Adverse
	Barrier effects	Embedded mitigation	Negligible and Not Significant	Adverse
Goshawk	Displacement/disturbance	Embedded mitigation	Negligible and Not Significant	Adverse
	Barrier effects	Embedded mitigation	Negligible and Not Significant	Adverse
Red kite	Displacement/disturbance	Embedded mitigation	Negligible and Not Significant	Adverse
	Barrier effects	Embedded mitigation	Negligible and Not Significant	Adverse
Peregrine	Displacement/disturbance	Embedded mitigation	Negligible and Not Significant	Adverse
	Barrier effects	Embedded mitigation	Negligible and Not Significant	Adverse
Cumulative Effects				
Nightjar	Habitat Loss	Implementation of OHMP	Negligible and Not Significant	Adverse
	Displacement/disturbance	Embedded mitigation	Negligible and Not Significant	Adverse
	Barrier effects	Embedded mitigation	Negligible and Not Significant	Adverse
Osprey	Habitat Loss	Implementation of OHMP	Negligible and Not Significant	Adverse



IOF Species	Potential Effect	Mitigation/Enhancement Measure(s)	Significance of Residual Effect	
			Level and Significance	Beneficial/ Adverse
	Displacement/disturbance	Embedded mitigation	Minor and Not Significant	Adverse
	Barrier effects	Embedded mitigation	Negligible and Not Significant	Adverse
	Collision risk	Additional mitigation	Minor and Not Significant	Adverse
Greylag goose	Habitat Loss	Implementation of OHMP	Negligible and Not Significant	Adverse
	Displacement/disturbance	Embedded mitigation	Negligible and Not Significant	Adverse
	Barrier effects	Embedded mitigation	Negligible and Not Significant	Adverse
	Collision risk	-	Negligible and Not Significant	Adverse
Pink-footed goose	Habitat Loss	Implementation of OHMP	Negligible and Not Significant	Adverse
	Displacement/disturbance	Embedded mitigation	Negligible and Not Significant	Adverse
	Barrier effects	Embedded mitigation	Negligible and Not Significant	Adverse
	Collision risk	-	Negligible and Not Significant	Adverse
Oystercatcher	Habitat Loss	Implementation of OHMP	Negligible and Not Significant	Adverse
	Displacement/disturbance	Embedded mitigation	Negligible and Not Significant	Adverse



IOF Species	Potential Effect	Mitigation/Enhancement Measure(s)	Significance of Residual Effect	
			Level and Significance	Beneficial/ Adverse
	Barrier effects	Embedded mitigation	Negligible and Not Significant	Adverse
Lapwing	Habitat Loss	Implementation of OHMP	Negligible and Not Significant	Adverse
	Displacement/disturbance	Embedded mitigation	Negligible and Not Significant	Adverse
	Barrier effects	Embedded mitigation	Negligible and Not Significant	Adverse
Curlew	Habitat Loss	Implementation of OHMP	Negligible and Not Significant	Adverse
	Displacement/disturbance	Embedded mitigation	Negligible and Not Significant	Adverse
	Barrier effects	Embedded mitigation	Negligible and Not Significant	Adverse
Snipe	Habitat Loss	Implementation of OHMP	Negligible and Not Significant	Adverse
	Displacement/disturbance	Embedded mitigation	Negligible and Not Significant	Adverse
	Barrier effects	Embedded mitigation	Negligible and Not Significant	Adverse
Goshawk	Habitat Loss	Implementation of OHMP	Negligible and Not Significant	Adverse
	Displacement/disturbance	Embedded mitigation	Negligible and Not Significant	Adverse
	Barrier effects	Embedded mitigation	Negligible and Not Significant	Adverse



IOF Species	Potential Effect	Mitigation/Enhancement Measure(s)	Significance of Residual Effect	
			Level and Significance	Beneficial/ Adverse
Red kite	Habitat Loss	Implementation of OHMP	Negligible and Not Significant	Adverse
	Displacement/disturbance	Embedded mitigation	Negligible and Not Significant	Adverse
	Barrier effects	Embedded mitigation	Negligible and Not Significant	Adverse
Peregrine	Habitat Loss	Implementation of OHMP	Negligible and Not Significant	Adverse
	Displacement/disturbance	Embedded mitigation	Negligible and Not Significant	Adverse
	Barrier effects	Embedded mitigation	Negligible and Not Significant	Adverse



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9.13 Abbreviations List

Abbreviation	Meaning
BoCC5	Birds of Conservation Concern 5
BREP	Biodiversity Restoration and Enhancement Plan
CIEEM	Chartered Institute of Ecology and Environmental Management
CRM	Collision Risk Modelling
CRSG	Central Raptor Study Group
DRP	Decommissioning and Restoration Plan
ECow	Ecological Clerk of Works
EIA	Environmental Impact Assessment
EU	European Union
FAS	Flight Activity Surveys
FLS	Forestry and Land Scotland
GIS	Geographic Information Systems
IOF	Important Ornithological Feature
JNCC	Joint Nature Conservation Committee
LBAP	Local Biodiversity Action Plan
LNR	Local Nature Reserve
MBBS	Moorland Breeding Bird Surveys
NHZ	Natural Heritage Zone
NNR	National Nature Reserve
NS	NatureScot
NPF4	National Planning Framework 4
BREP	Ornithology Habitat Management Plan
RSPB	Royal Society for the Protection of Birds
SBL	Scottish Biodiversity List
SEPA	Scottish Environment Protection Agency
SNH	Scottish Natural Heritage (former name of NatureScot)
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
VP	Vantage Point
UK	United Kingdom
UKBF	UK Biodiversity Framework



Making Sustainability Happen



Chapter 10: Hydrology, Hydrogeology, Geology and Soils

Environmental Impact Assessment Report

Cairnoch Hill Wind Farm

3 August 2026



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Revision	Prepared By	Checked By	Approved By	Description
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10.0 Hydrology, Hydrogeology, Geology and Soils

10.1 Introduction

- 10.1.1 This chapter presents the findings of the likely significant effects of the Proposed Development on hydrology, hydrogeology, geology and soils (including peat).
- 10.1.2 The specific objectives of this chapter are to:
- Describe the assessment methodology and significance criteria used in completing the impact assessment;
 - Describe the geological, hydrological, hydrogeological and peat baseline established from desk studies, site-specific surveys and feedback obtained during technical engagement with stakeholders;
 - Describe the potential effects, including direct, indirect and cumulative effects;
 - Describe the mitigation measures proposed to address the likely significant effects; and
 - Assess any residual effects following the implementation of any additional mitigation measures.
- 10.1.3 The assessment uses information and findings presented in **Chapter 8: Ecology** to inform the assessment of potential effects of possible areas of Groundwater Dependent Terrestrial Ecosystems (“GWDTE”s) which are presented in this chapter.
- 10.1.4 This chapter is supported by the following Figures and Technical Appendices:
- Figures:
 - **Figure 10.1: Hydrological Features;**
 - **Figure 10.2: Watercourses and Flooding;**
 - **Figure 10.3: Soils;**
 - **Figure 10.4: Superficial Deposits;**
 - **Figure 10.5: Peatland Classification;**
 - **Figure 10.6: Peat Depth Plan;**
 - **Figure 10.7: Peatland Condition;**
 - **Figure 10.8: Bedrock Geology;**
 - **Figure 10.9: Aquifer Classification and Groundwater Vulnerability;** and
 - **Figure 10.10: Potential Groundwater Dependent Terrestrial Ecosystems.**
 - Technical Appendices:
 - **Technical Appendix 10.1: Peat Landslide Hazard Risk Assessment (“PLHRA”);**
 - **Technical Appendix 10.2: Outline Soil and Peat Management Plan (“SPMP”);**
 - **Technical Appendix 10.3: Schedule of Watercourse Crossing;**



- **Technical Appendix 10.4: Private Water Supply Risk Assessment (“PWSRA”);**
- **Technical Appendix 10.5: Peatland Condition Assessment;** and
- **Technical Appendix 10.6: Borrow Pit Appraisal.**

10.1.5 The assessment has been undertaken in accordance with relevant policy, legislation and guidance as standard for similar development proposals in this area. Legislation, guidance and policy relevant to this assessment is detailed in **Technical Appendix 4.1.**

10.1.6 An appraisal of the Proposed Development’s compliance with relevant policy is given in the separate, standalone **Planning Statement** provided as part of the suite of planning application documents.

10.2 Consultation

10.2.1 Consultation undertaken with statutory and non-statutory consultees relevant to hydrology, hydrogeology and geology are summarised in **Table 10-1.**

Table 10-1: Summary of Scoping and Post-Scoping Consultation

Consultation Details	Consultee Comments	Applicant Response
Stirling Council		
Scoping Opinion 31 October 2024	SEPA would welcome engagement with Eurowind Energy Limited (the “Applicant”) at an early stage. They have stated that to avoid delays and a potential objection, the Environmental Impact Assessment (“EIA”) submission must contain a series of scale drawings of sensitivities, for example peat depth, peat condition, Groundwater Dependent Terrestrial Ecosystems, proximity to watercourses; all overlain with the proposed development.	Noted. Figures 10.1 to 10.10 show the Proposed Development in context of the geological, hydrological and hydrogeological setting.
Scoping Opinion 31 October 2024	The proposal will also need to cover issues including the water environment, flood risk, peat and peatland, existing groundwater abstractions, forest removal and forest waste, pollution prevention and environmental management; life extension, repowering and decommissioning; which is necessary to ensure the EIA process has informed the layout of the development to firstly avoid, then reduce, and then mitigate significant impacts on the environment.	Noted. These issues raised are discussed in Sections 10.4 to 10.7 of this chapter.
Scoping Opinion 31 October 2024	In response to the site-specific information, SEPA note that based on the information provided at this stage it seems unlikely that any development will take place within 250m of a groundwater supply source but ask	Noted. A private water supply risk assessment has been completed in accordance with SEPA guidance on assessing the impacts of developments on



Consultation Details	Consultee Comments	Applicant Response
	<i>that the EIA report provides evidence to confirm this. Details of regulatory requirements and good practice advice, for example in relation to engineering works in the water environment and waste management, can be found on SEPA's regulations section of their website.</i>	<i>groundwater abstractions and is presented in Technical Appendix 10.4: PWSRA and summarised in Section 10.4 of this chapter.</i>
<i>Scoping Opinion 31 October 2024</i>	<i>Provided watercourse crossings are designed to accommodate the 1 in 200-year event plus climate change and other infrastructure is located well away from watercourses SEPA do not foresee a need for detailed information on flood risk. On the basis of the information submitted and that forthcoming, it is confirmed that habitat survey information is not required for areas which are heavily forested or recently felled.</i>	<i>A commitment has been made to ensure that all watercourse crossings are designed to accommodate the 1 in 200-year event plus an appropriate allowance for climate change, as discussed in Section 10.5 and Technical Appendix 10.3: Schedule of Watercourse Crossings. A 50m buffer to watercourses and waterbodies shown on the 1:10,000 scale mapping has also been applied (see Figure 10.2 and Section 10.5) and it is confirmed that, except for the proposed watercourse crossings and existing access tracks, no infrastructure is proposed within the 50m watercourse buffer. This is discussed further in Section 10.5 of this chapter.</i>
<i>Scoping Opinion 31 October 2024</i>	<i>In respect of drinking water, Scottish Water advises that there is live infrastructure in the proximity of this development area and that the proposal may impact on existing Scottish Water Assets. The proposed activity falls partly within two drinking water catchment areas where a Scottish Water abstraction is located. Scottish Water abstractions are designated as Drinking Water Protected Areas (DWPA) under Article 7 of the Water Framework Directive. The Carron Valley Reservoir supplies Carron Valley Water Treatment Works and it is essential that water quality and water quantity in the area are protected. This is a strategic asset and Scottish Water will need further involvement as the development progresses through the planning phases.</i>	<i>See Scottish Water response below.</i>



Consultation Details	Consultee Comments	Applicant Response
<i>Scoping Opinion</i> 31 October 2024	<i>Scottish Water has produced a list of precautions for a range of activities. This details protection measures to be taken within a DWPA, the wider drinking water catchment and if there are assets in the area. These documents and other supporting information can be found on the activities within Scottish Water's catchments page of our website at www.scottishwater.co.uk/slm. Scottish Water has advised that site specific risks and mitigation measures require to be assessed and implemented; the fact that the site is located within a drinking water catchment should be noted in relevant documentation. Anyone working on site should be made aware of risks to the water environment during site inductions and further involvement at the more detailed design stages should take place with Scottish Water in order to allow it to determine the most appropriate proposals and mitigation within the catchment to protect water quality and quantity. The Applicants are advised to make early contact with Scottish Water to ensure that the effects proposed to be scoped out can be managed and controlled by way of a Construction Site Licence application in agreement with Scottish Water.</i>	<i>Noted. See Scottish Water response below.</i>
NatureScot		
<i>Scoping Response</i> 11 October 2024	<i>The site includes watercourses that are within the catchment of the Endrick Water SAC, designated for Atlantic salmon, brook lamprey and river lamprey. We consider that there is connectivity between the development proposal and the SAC.</i> <i>We advise consideration is given to the potential effects of construction, operation and decommissioning of the proposed development in relation to the qualifying features of the SAC. The qualifying interests are sensitive to disturbance to the river habitat, including silt and sediment entering the watercourse and smothering gravel beds, suspended solids in the water column, pollution events, and changes in water quality and in water chemistry. Further information on this is given in the SNH publication 'Guidance for Competent Authorities when dealing</i>	<i>Noted.</i> <i>Potential hydrological effects of the Proposed Development on the Special Area of Conservation (SAC) are discussed in this chapter</i> <i>Potential effects on the SAC are also discussed in Chapter 8 and a HRA is presented in Technical Appendix 8.6.</i>



Consultation Details	Consultee Comments	Applicant Response
	<i>with proposals affecting SAC freshwater sites'.</i> <i>Potential impacts can be addressed by good wind farm design, including embedded mitigation, by commitment to the employment of good construction and pollution prevention methods, the preparation and implementation of a Construction Environmental Management Plan (CEMP) or similar and having an Ecological Clerk of Works (ECoW) on site at appropriate stages of the development. Reference should be made to our guidance 'Good practice during windfarm construction', available on our website.</i> <i>We advise that sufficient information should be provided in the EIA report to enable an appraisal of the likely impact of the proposed development on the qualifying interests of the River Endrick SAC. A Habitats Regulation Appraisal (HRA) will be required.</i>	
Scoping Response 11 October 2024	<i>We consider that the proposed development is not in sufficient connectivity with and is therefore unlikely to have a significant impact on, any other site designated for its nature conservation value.</i>	Noted.
Scoping Response 11 October 2024	<i>The scoping report states that NVC and UKHab surveys have been carried out, with GWDTE and Annex 1 habitats also surveyed for.</i>	Areas of potential GWDTE are shown on Figure 10.10 and potential impacts on GWDTE are discussed in Section 10.4 of this chapter.
Scoping Response 11 October 2024	<i>It cannot be ascertained whether the proposal is located on areas of priority peatland from the 'Carbon and Peatland 2016' mapping layer, however there is unlikely to be priority peatland within the proposed site location. We are content that, as stated within the scoping report, additional peat probing will be undertaken which will be used to inform the final site layout, a peatland management plan and a peat landslide hazard risk assessment.</i> <i>If peatland vegetation or areas of remnant peatland habitat are identified on this site, then further consideration should be given to the underlying depth of peat on the site. Any secondary effects on vegetation interests should be considered, assessed and any mitigation proposals</i>	Noted. A comprehensive peat depth probing programme has been completed across this Site. Potential impacts on peat are discussed in full in Technical Appendices 10.1: PLHRA and 10.2: SPMP and summarised in Sections 10.4 to 10.7 of this chapter.



Consultation Details	Consultee Comments	Applicant Response
	<i>presented in the ES. This includes any changes to land management practice resulting from the presence of a wind farm. It is helpful if the maps that present vegetation recorded on-site are also marked with the finalised layout of the windfarm proposal, including turbines and tracks.</i>	
Carron Valley Community Council		
Scoping Response October 2024	<i>Ground water from Cairnoch Hill is a drinking water source and a resident has asked that adequate investigation is carried out on the effect of the development will have on water quality.</i>	<i>A private water supply risk assessment has been completed in accordance with SEPA guidance assessing the impacts of developments on groundwater abstractions and is presented in Technical Appendix 10.4: PWSRA and summarised in Section 10.4 of this chapter.</i>
Scottish Environment Protection Agency (SEPA)		
Scoping Response 14 October 2024	<i>To avoid delay and potential objection the EIA submission must contain a series of scale drawings of sensitivities, for example peat depth, peat condition, Groundwater Dependent Terrestrial Ecosystems (GWDTE), proximity to watercourses, overlain with proposed development. This is necessary to ensure the EIA process has informed the</i>	<i>Figures 10.1 to 10.10 show the Proposed Development in context of the geological, hydrological and hydrogeological setting.</i>
Scoping Response 14 October 2024	<i>Based on the information provided at this stage it seems unlikely that any development will take place within 250m of a groundwater supply source; if this is the case it would be helpful if the EIA report provides evidence to confirm this.</i>	<i>A private water supply risk assessment has been completed in accordance with SEPA guidance on assessing the impacts of developments on groundwater abstractions and is presented in Technical Appendix 10.4: PWSRA and summarised in Section 10.4 of this chapter.</i>
Scoping Response 14 October 2024	<i>Provided watercourse crossings are designed to accommodate the 1 in 200-year event plus climate change and other infrastructure is located well away from watercourses we do not foresee from current information a need for detailed information on flood risk.</i>	<i>It is confirmed that watercourse crossings will be sized to accommodate the 1 in 200-year event with an appropriate allowance for climate change. A schedule of the watercourse crossing is presented in Technical Appendix 10.3: Schedule of Watercourse Crossings. A 50m buffer to all watercourses and waterbodies shown on the</i>



Consultation Details	Consultee Comments	Applicant Response
		1:10,000 scale mapping has been applied (see Figure 10.2 and Section 10.5). No development, except for the proposed watercourse crossing and existing access tracks, are proposed within this 50m buffer. This is discussed further in Section 10.5 of this chapter.
Scottish Water		
Scoping Response 4 October 2024	Scottish Water has no objection to this proposal.	Noted.
Scoping Response 4 October 2024	A review of our records indicates that the proposed activity falls partly within two drinking water catchments where a Scottish Water abstraction is located. Scottish Water abstractions are designated as Drinking Water Protected Areas (DWPA) under Article 7 of the Water Framework Directive. Carron Valley Reservoir supplies Carron Valley Water Treatment Works (WTW) and therefore it is essential that water quality and water quantity in the area are protected. This is a strategic asset and therefore Scottish Water will need further involvement as this development progresses through the planning phases and frequent site visits will be vital during the construction period. We would also like to understand if PFAS will be used to coat any of the turbines or associated infrastructure. Scottish Water are now monitoring for PFAS, and this is something we are review closely with the DWQR. Scottish Water have produced a list of precautions for a range of activities. This details protection measures to be taken within a DWPA, the wider drinking water catchment and if there are assets in the area. Please note that site specific risks and mitigation measures will require to be assessed and implemented. These documents and other supporting information can be found on the activities within our catchments page of our website at www.scottishwater.co.uk/slm. We welcome receipt of this notification about the proposed activity within a drinking water catchment where a Scottish Water abstraction is located.	Noted. Potential effects on the Carron Valley Reservoir DWPA are discussed in Sections 10.4 to 10.7 of this chapter.



Consultation Details	Consultee Comments	Applicant Response
	<i>We would like more involvement in the more detailed design stages of the proposal and detail of the further information requested above.</i> <i>The fact that this area is located within a drinking water catchment should be noted in documentation. Also anyone working on site should be made aware of this during site inductions and we would also like to take the opportunity, to request that 3 months in advance of any works commencing on site, Scottish Water is notified at protectdwsources@scottishwater.co.uk so we can make our operational teams aware there will be activity taking place in the catchment.</i>	
<i>Scoping Response 4 October 2024</i>	<i>Scottish Water records indicate that there is live infrastructure in the proximity of your development area that may impact on existing Scottish Water assets.</i> <i>The applicant must identify any potential conflicts with Scottish Water assets and contact our Asset Impact Team via our Customer Portal for an appraisal of the proposals.</i> <i>The applicant should be aware that any conflict with assets identified will be subject to restrictions on proximity of construction. Please note the disclaimer at the end of this response.</i> <i>Written permission must be obtained before any works are started within the area of our apparatus.</i>	<i>Noted.</i> <i>Scottish Water asset plans have been reviewed to inform this assessment as discussed in Sections 10.4 and 10.7 of this chapter.</i>
<i>Scoping Response 4 October 2024</i>	<i>For reasons of sustainability and to protect our customers from potential future sewer flooding, Scottish Water will not accept any surface water connections into our combined sewer system.</i>	<i>Noted.</i>
<i>Post-scoping consultation 6 February 2026</i>	<i>Scottish Water confirmed no aspect of their drinking water infrastructure or transmission pipework is likely to be affected by the Proposed Development.</i> <i>They confirm that ground truthing the exact location of the pipework adjacent to the proposed Site entrance would be required prior to the commencement of works.</i>	<i>Noted.</i> <i>It is confirmed that the Scottish Water assets will be protected as discussed in Section 10.7 of this chapter.</i>



10.3 Assessment Methodology and Significance Criteria

- 10.3.1 The potential impacts associated with the Proposed Development on hydrology hydrogeology, geology and soils have been assessed by completing an initial desk study followed by an impact assessment. Characterisation of baseline conditions and the impact assessment have been informed by a programme of field surveys.

Study Area

- 10.3.2 The Study Area for this assessment is shown on **Figure 10.1**. The Study Area encompasses the areas over which all desk based, and field data were gathered to inform the assessment and includes a 500m buffer (as agreed by NatureScot at Scoping stage) from the location of the Proposed Development (“the Site”), specifically the Site boundary. This buffer reflects professional judgement and industry best practice regarding the implementation of appropriate mitigation measures and represents a reasonable Zone of Influence (Zoi) for potential effects on the hydrological and hydrogeological environment for onshore wind projects. Beyond this distance any effect is considered to be so diminished as to be undetectable and therefore not significant.
- 10.3.3 The assessment for potential cumulative effects (see Section 10.10) uses the hydrological and hydrogeological catchments within the Study Area, with a maximum distance of 5km (as agreed by NatureScot at Scoping stage) from the Site boundary. The cumulative assessment was limited to a 5km study area, as potential effects are anticipated to diminish with distance from the Proposed Development and are expected to become undetectable beyond this extent due to dilution, sediment settlement, attenuation and increasing hydrological disconnection.

Desk Study

- 10.3.4 An initial desk study has been undertaken to determine and confirm baseline characteristics by reviewing available information on geology, peat, hydrology and hydrogeology.
- 10.3.5 The following information sources have been reviewed to inform the desk study:
- Ordnance Survey (OS) 1:50,000, 1:25,000 and 1:10,000 scale mapping;
 - NatureScot SiteLink;
 - NatureScot’s (formerly Scottish Natural Heritage) Carbon and Peatland 2016 map;
 - James Hutton Institute, National Soil Map of Scotland (1:250,000);
 - British Geological Survey (BGS) Onshore GeoIndex (1:50,000);
 - BGS Hydrogeological maps of Scotland (1,100,000 scale Aquifer Productivity and Groundwater Vulnerability datasets);
 - Fisheries Management Scotland (FMS) District Salmon Fishery Board and River/Fisheries Trust information; and
 - SEPA rainfall data, flood maps, reservoir flooding map and environmental data.



Field Surveys

- 10.3.6 Detailed Site visits and walkover surveys have been undertaken by SLR Consulting Limited on the following dates:
- May 2022 to complete site reconnaissance walkover and initial peat depth and geomorphological survey;
 - October 2024 to complete additional peat and soil depth probing;
 - September 2025 to complete additional peat and soil depth probing, a hydrological walkover, watercourse crossing survey, review areas of potential GWDTE and complete a private water supply survey; and
 - April 2026 to complete additional peat depth and watercourse crossing surveys.
- 10.3.7 The field surveys were undertaken in order to:
- Verify the information collected during the desk and baseline study;
 - Allow the assessment authors to obtain a first-hand appreciation of the Site;
 - Undertake a visual assessment of the main surface water features within the Site and identify and verify private water supplies within the Study Area;
 - Visit any identified potential GWDTE areas (in consultation with the project ecologists);
 - Visit potential watercourse crossings and prepare a schedule of potential watercourse crossings;
 - Inspect rock exposures and establish by probing, an estimate of overburden thicknesses, peat depth and stability;
 - Confirm underlying substrate, based on the type of refusal of a peat probe and by coring;
 - Assess peatland condition within the Site; and
 - Determine gradients, potential borrow pit locations, access routes, ground conditions, etc., and to assess the relative location of all the components of the Proposed Development.
- 10.3.8 The desk and field surveys have been used to identify potential development constraints and have been used as part of the iterative design process. Further details on the design process and evolution of the Proposed Development are found in **Chapter 2: Design Evolution and Alternatives**.
- 10.3.9 The data obtained as part of the desk study and collected as part of the field work has been processed and interpreted to complete the impact assessment and recommend mitigation measures where appropriate.

Assessment of Potential Effect Level and Significance

- 10.3.10 **Chapter 5: Environmental Impact Assessment** provides an overview on the general approach to the Environmental Impact Assessment (“EIA”).
- 10.3.11 The significance of potential effects as a result of the Proposed Development has been assessed by considering two factors: the sensitivity of the receiving environment and the potential magnitude of impact, should that effect occur.



- 10.3.12 This approach provides a mechanism for identifying the areas where mitigation measures are required and for identifying mitigation measures appropriate to the significance of the likely effects as a result of the Proposed Development.
- 10.3.13 The assessment methodology has also been informed by experience of carrying out assessments for a range of wind farm and other renewable developments, knowledge of the geology and water environment characteristics in Scotland and cognisance of good practice.
- 10.3.14 The criteria for determining the significance of effect are provided in **Table 10-2**, **Table 10-3** and **Table 10-4**.

Sensitivity of Receptor

- 10.3.15 The sensitivity of the receiving environment (i.e. the baseline quality of the receiving environment) is defined as its ability to absorb an effect without a detectable change and can be considered through a combination of professional judgement and criteria set by guidance which is set out in **Table 10-2**.
- 10.3.16 Receptors in the receiving environment only need to meet one of the defined criteria to be categorised at the associated level of sensitivity.

Table 10-2: Criteria for Assessing Sensitivity of Receptor

Sensitivity	Description
High	• Soil type and associated land use is highly sensitive (e.g. unmodified blanket bog or peatland, Class 1 or 2 priority peatland habitats or prime agricultural land); • Extensive areas of deep peat (>1 m deep) are recorded; • SEPA Water Framework Directive (“WFD”) water body classification of moderate to high; • Receptor is of high ecological importance or of national or international value (e.g. Geological Conservation Review site (“GCR”), Site of Special Scientific Interest (“SSSI”), Special Area of Conservation (“SAC”), habitat for protected species) where a designated features are dependent on geological, hydrology and/or hydrogeology environment; • Extensive areas of flooding are recorded on SEPA’s future flood maps and/or water body acts as an active floodplain or flood defence; • Receptor has been identified as a Potential Vulnerable Area (“PVA”); • Receptor is used for public and/or private water supply (including Drinking Water Protected Areas); • Groundwater vulnerability is classified as Class 4 to 5; • Groundwater aquifer is considered highly productive aquifer; and • Areas of potential GWDTE have been identified and considered to be predominately supported by groundwater.
Medium	• Soil type and associated land use moderately sensitive (e.g. arable land which is not classified as prime, commercial forestry or modified peatland e.g. by drainage or forestry or Class 3 and 5 peatland habitats); • Areas of peat <1 m deep are recorded; • SEPA’s WFD water body classification of poor to moderate; • Isolated areas of flooding are recorded on SEPA’s future flood maps which are shallow (<0.3 m deep) and / or confined to immediate waterbody corridors; • Groundwater aquifer vulnerability of Class 2 to 3; • Groundwater aquifer is considered a moderately productivity aquifer; and



Sensitivity	Description
	Areas of potential GWDTE have been identified and considered to be predominately supported by rainfall and / or surface water.
Low	- Soil type and associated land use not sensitive to change in hydrological regime and associated land use (e.g. intensive grazing of sheep and cattle or Class 4 and 0 peatland habitats); - No peat deposits are recorded; - SEPA WFD water body classification of poor to bad; - Development is not shown to be at risk of flooding on SEPA's future flood maps; - Groundwater vulnerability is classified as Class 0 to 1; - Groundwater aquifer is not considered a significant aquifer or low to very low productivity; - Receptor not used for water supplies (public or private); and - No areas of potential GWDTE have been identified.
Not Sensitive	Receptor would not be affected by the Proposed Development e.g. lies within a different and unconnected geological, hydrological and / or hydrogeological catchment.

Magnitude of Change

10.3.17 The potential magnitude of change would depend upon whether the potential impact would cause a fundamental, material or detectable change. In addition, the timing, scale, size and duration of the potential impact resulting from the Proposed Development are also determining factors.

10.3.18 The criteria that have been used to assess the magnitude of impact are defined in **Table 10-3**. The characteristics of the impacts are described as direct / indirect, temporary (reversible) or permanent (irreversible), together with timescales (short, medium and long term).

Table 10-3: Criteria for Assessing Magnitude of Change

Sensitivity	Criteria	Description
High	Results in the loss of an attribute	Long term or permanent changes to the baseline hydrology, hydrogeology and geology (including soils and peat) such as: - Permanent degradation and total loss of soils or peatland habitat; - Loss of important geological structure/features; - Wholesale changes to watercourse channel or floodplain, surface water flow paths, hydrology or hydrodynamics; - Changes to the baseline environment resulting in an increase in surface water runoff with flood potential and also significant changes to erosion and sedimentation patterns; - Major changes to the water chemistry; and - Major changes to groundwater levels, flow regime and risk of groundwater flooding.
Medium	Results in an impact on integrity of attribute or loss of part of an attribute	Material but non-fundamental and short to medium term changes to the baseline hydrology, hydrogeology and geology (including soils and peat) such as: - Loss of extensive areas of soils or peat habitat, damage to important geological structures/features; - Some fundamental changes to watercourses, floodplains, surface water flow paths, hydrology or hydrodynamics;



Sensitivity	Criteria	Description
		- Changes to baseline environment resulting in an increase in surface water runoff within system capacity; - Moderate changes to erosion and sedimentation patterns; - Moderate changes to the water chemistry of surface runoff and groundwater; and - Moderate changes to groundwater levels, flow regime and risk of groundwater flooding.
Low	Results in minor impact on an attribute	Detectable but non-material and transitory changes to the baseline hydrology, hydrogeology and geology (including soils and peat) such as: - Minor or slight loss of soils or peatland or slight damage to geological structures/features; - Minor or slight changes to the watercourse, floodplains, surface water flow paths, hydrology or hydrodynamics; - Changes to baseline environment resulting in slight increase in surface water runoff within the drainage system capacity; - Minor changes to erosion and sedimentation patterns; - Minor changes to the water chemistry of surface runoff and groundwater; and - Minor changes to groundwater levels, flow regime and risk of groundwater flooding.
Negligible	Results in an impact on attribute but of insufficient magnitude to affect the use or integrity	No perceptible changes to the baseline hydrology, hydrogeology and geology (including soils and peat) such as: - No impact or alteration to existing important soils, peatland or geological environs; - No alteration or very minor changes with no impact to watercourses, floodplains, surface water flow paths, hydrology, hydrodynamics, erosion and sedimentation patterns; - No pollution or change in water chemistry to either groundwater or surface water; and - No alteration to groundwater recharge or flow mechanisms.

Significance of Effect

- 10.3.19 Where effects are considered to be significant, these are identified within this chapter. The level, and therefore significance, of the resultant effect is informed by professional judgement as to the importance or sensitivity of the affected receptor(s) and the nature and magnitude of the predicted changes. **Table 10-4** is used as a guide to demonstrate the relationship between the sensitivity of the identified receptor and the anticipated magnitude of change. Professional judgement is, however, equally important in verifying the suitability of this guiding 'formula' to the assessment of the level of each individual effect.
- 10.3.20 Using professional judgement and with reference to relevant guidance, effects assessed as being of moderate or greater level are considered to be significant in EIA terms. If there are deviations from this, these are clearly stated within the chapter.
- 10.3.21 Effects of 'major' or 'moderate' significance outlined in **Table 10-4** are considered to be significant in terms of the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 ("EIA Regulations") within this assessment.



Table 10-4: Significance of Effect Criteria

		Sensitivity of Receptor / Receiving Environment to Change			
		High	Medium	Low	Negligible
Magnitude of Change	High	Major	Major	Moderate	Negligible
	Medium	Major	Moderate	Minor	Negligible
	Low	Moderate	Minor	Minor	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

Assessment of Cumulative Effects

10.3.22 The assessment also considers potential cumulative effects associated with other developments within 5km of the Site and in the same surface water catchments as the Proposed Development (see Section 10.10). A cumulative effect is considered to be the effect on a hydrological, hydrogeological or geological receptor arising from the Site in combination with other developments within the cumulative Study Area which are likely to affect soils or geology, surface water and groundwater.

Committed Mitigation and Enhancement

10.3.23 Any potential effects of the Proposed Development on hydrology, hydrogeology, geology and soils identified by the assessment have been addressed and mitigated by the design of the Proposed Development (embedded mitigation) and the application of good practice guidance to be implemented as standard during construction and operation, to prevent, reduce or offset effects where possible. As such, several good practice measures would form an integral part of the construction process, and these have been considered prior to assessing the likely effects of the Proposed Development (standard mitigation).

10.3.24 Good practice measures would be applied in relation to pollution risk, sediment management, peat management and management of flood risk and surface runoff rates and volumes. These would form part of the final Construction Environmental Management Plan (CEMP) which would be prepared during detailed design and secured by a planning condition prior to construction commencing. An outline CEMP is provided as **Technical Appendix 3.1**. An Operational Environmental Management Plan (OEMP) will also be prepared to maintain the relevant mitigation and management measures established during the construction phase into the operational phase of the Proposed Development.

10.3.25 The final CEMP would also include details and responsibilities for environmental management on-site for environmental aspects and would outline the necessary surface water management, oil and chemical delivery and storage requirements, waste management, traffic and transport management and would specify response procedures to environmental incidents as well as monitoring requirements for wastewater, water supply and all appropriate method statements and risk assessments for the construction of the Proposed Development.

Assessment of Residual Effect Level and Significance

10.3.26 The assessment of residual effects follows the same process and criteria as the assessment of potential effects but takes account of the committed additional (secondary) mitigation and enhancement measures.

10.3.27 Effects of 'major' or 'moderate' significance outlined in **Table 10-4** are considered to be significant in terms of the EIA Regulations within this assessment.



Limitations to Assessment

- 10.3.28 The assessment uses survey data obtained within the site and publicly available data sources, including but not limited to SEPA, BGS, NatureScot, and Stirling Council, as well as additional information supplied from stakeholders during the scoping and consultation stages.
- 10.3.29 It is considered that the data and information used to complete this assessment is robust and that there are no significant data gaps or limitations.

10.4 Baseline Conditions

Climate and Topography

- 10.4.1 The Site setting and local hydrology is presented as **Figure 10.1** and **10.2**.
- 10.4.2 Ground elevations at the Site and surrounding area generally decrease south-westwards towards Carron Valley Reservoir. Elevations within the Site range from approximately 413m Above Ordnance Survey ("AOD"), within the centre of the Site at the summit of Cairnoch Hill, to approximately 227m AOD along the south western boundary of the Site near the B818.
- 10.4.3 SEPA has provided precipitation data for the Earlsburn Reservoir rain gauge (station 568155) which is located approximately 1.8km north of the Site. In 2025 a precipitation total of 1,575.8mm was recorded.

Statutory Designated Sites

- 10.4.4 Review of NatureScot SiteLink website confirms there are no designated sites within the Study Area, as shown on **Figure 10.1**.
- 10.4.5 The Endrick Water, approximately 2km west of the Site, has been designated as part of the Endrick Water SSSI and SAC. The SSSI and SAC have been designated for salmon, brook and river lamprey, fluvial geomorphology and quaternary rock outcrops and vascular plants.
- 10.4.6 As discussed in the NatureScot scoping response presented in **Table 10-1**, the Endrick Water SSSI and SAC is located within the same surface water catchment as the Proposed Development and therefore hydrologically connected to the Proposed Development.
- 10.4.7 Potential effects as a consequence of the Proposed Development on the SSSI and SAC are also considered in **Chapter 8: Ecology**.

Soils and Geology

Soils

- 10.4.8 An extract of the 1:250,000 scale Scotland's Soils mapping is presented as **Figure 10.3** which indicates that the northern extent of the Site is underlain by peaty gleyed podzols whilst the southern, western and eastern extent of the Site is underlain by mineral gleys and brown earth soils.

Peat and Superficial Geology

- 10.4.9 BGS superficial mapping, see **Figure 10.4**, shows that, where recorded, the majority of superficial deposits within the Site comprise glacial till deposits. Areas of peat are recorded within the northern extent of the Site and hummocky glacial deposits are noted along the northern, western and southern boundary of the Site.



- 10.4.10 Areas of the centre and southern extent of the Site are shown to be absent of any superficial deposits.
- 10.4.11 Peatland classification mapping (see **Figure 10.5**) shows that majority of the Site is underlain by Class 4 peatland areas and mineral soils (Class 0) which are not considered to represent peatland habitats.
- 10.4.12 Areas within the northern extent of the Site are shown to be located within Class 5 peatland areas and a small area within the centre of the Site, near Cairnoch Hill, is shown to be underlain by Class 3 peatland. Class 3 and Class 5 peatlands are not considered priority peatland habitats however soils may remain carbon-rich with areas of deep peat.
- 10.4.13 As part of the baseline assessment, comprehensive peat probing and condition surveys have been undertaken in accordance with current guidance published by Scottish Government, SEPA and NatureScot. The results of the surveys are shown on **Figures 10.6** and **Figure 10.7** and have been used to inform a site-specific Peat Landslide Hazard Risk Assessment (PLHRA), outline Soils and Peat Management Plan (SPMP) and Peatland Condition Assessment (see **Technical Appendix 10.1**, **Technical Appendix 10.2** and **Technical Appendix 10.5**).
- 10.4.14 To summarise, site surveys have confirmed:
- The majority of the Site recorded a peat depth <0.5m (approximately 86.4% of all peat probes recorded) with an average thickness of peat across the Proposed Development of 0.3m;
 - Localised areas of peat >1m deep are recorded near the northern and eastern boundary of the Site. A maximum depth of 2.1m was recorded within the northern extent of the Site; and
 - The condition of the peat at the Site has been classified as artificially drained or modified.
- 10.4.15 Further details of the peat depth and condition surveys are discussed in **Technical Appendices 10.1** and **10.2**.

Bedrock Geology

- 10.4.16 An extract of the BGS regional bedrock geological and linear features mapping is presented as **Figure 10.8**, which shows that the Site is underlain by basalts of the Spout of Ballochlearn Lava Member, Campsie Lava Member, Gargunnock Hills Lava Member and Overton Lava Member.
- 10.4.17 Other smaller igneous intrusive rocks are also noted within the Site comprising felsite and basaltic rocks of the Dinantian Dykes and Waterhead Central Volcanic-Complex respectively.
- 10.4.18 Several inferred faults are noted across the Site generally shown to have a south west to north east trend.

Hydrogeology

Aquifer Characteristics and Groundwater Vulnerability

- 10.4.19 Extracts of the BGS 1:625,000 scale Hydrogeology of Scotland map and 1:100,000 scale aquifer productivity and groundwater vulnerability datasets are presented on **Figure 10.9**.
- 10.4.20 The 1:625,000 scale hydrogeological data confirms that the bedrock underneath the Site has been classified by BGS as a low productivity aquifer whereby small



amounts of groundwater may be present within the near surface weathered zone, secondary fractures and rare springs.

- 10.4.21 The Aquifer Productivity and Groundwater Vulnerability datasets classify the underlying aquifer (superficial and bedrock) according to the predominant groundwater flow mechanism (fracture or intergranular) and the estimated groundwater productivity. Groundwater vulnerability is divided into five classes (1 to 5) with 1 being least vulnerable and 5 being most vulnerable.
- 10.4.22 The peat and glacial deposits are not considered as a significant aquifer.
- 10.4.23 The bedrock aquifer is confirmed to be a low productivity aquifer, generally without groundwater except at shallow depth with flow almost entirely through fractures and other discontinuities.
- 10.4.24 The potential groundwater vulnerability in the uppermost aquifer within the Site has a vulnerability of 4a, 4b and 5. The highest vulnerability is noted where little or no superficial deposits are recorded, and thus where there is little attenuation of potential pollutants prior to entry to shallow groundwater.

Groundwater Levels and Flow

- 10.4.25 In response to a data request SEPA has confirmed that they do not hold any specific groundwater level data within the Study Area.
- 10.4.26 Groundwater recharge at the Site will be limited by the following factors:
 - Steeper topographic gradients which will result in rainfall forming surface water runoff;
 - Presence of peaty soils and glacial till deposits inhibiting infiltration owing to their generally low bulk permeability; and
 - The underlying bedrock (where not weathered or fractured) as it generally displays a low permeability that limits groundwater recharge and prevents large scale storage and movement of the groundwater.
- 10.4.27 In the absence of published information or data held by SEPA, it is anticipated that groundwater will be present as perched groundwater within the more permeable horizons of the glacial till and within the weathered zone, fractures or faults within the bedrock deposits.
- 10.4.28 It is expected that groundwater flow is likely to follow local surface gradients (e.g. be approximated by the surface water catchment).

Groundwater Quality

- 10.4.29 All of Scotland's groundwater bodies have been designated as DWPA's under the Water Environment (Drinking Water Protected Area) (Scotland) Order 2013 and require protection for their current use or future potential use as drinking water resources.
- 10.4.30 The current status of groundwater bodies in Scotland has been classified by SEPA in accordance with the requirements of the WFD. SEPA has identified that the Site is located within two groundwater bodies. The majority of the Site is located within the Carron and Touch groundwater body (ID:150598) whilst the north western extent of the Site is located within the Campsie groundwater body (ID: 150614).
- 10.4.31 Both groundwater bodies were classified in 2024 (the latest reporting cycle) as having Good overall status with no pressures identified.



Groundwater Dependant Terrestrial Ecosystems (GWDTE)

10.4.32 A National Vegetation Classification (“NVC”) habitat mapping survey has been undertaken as part of the ecology baseline assessment, and this has been used to identify potential areas of GWDTE within the Site. The methodology and results of the NVC habitat mapping exercise are discussed in detail within **Chapter 8: Ecology**. With reference to the SEPA guidance, areas of potential GWDTE are shown in **Figure 10.10**. An assessment of the potential areas of GWDTE, and in particular if habitats are sustained by groundwater or surface water is presented in **Table 10-5**.

Table 10-5: GWDTE Risk Assessment

NVC Community	Location and Distribution of Potential GWDTE within the Site and Likely Groundwater Dependency
M6	Within 250 m of the Proposed Development, M6 habitats are noted as part of two larger M23 mosaic habitats recorded within the centre of the Site, near turbine T2. A M6 flush (Target Note TN16) was also recorded near turbine T2. These habitats are shown to be underlain by low permeability glacial till and peaty soil deposits. The habitats are also noted within existing forestry rides where drainage features were recorded and within mapped surface water flow paths as shown on the SEPA flood mapping. No groundwater emergence was recorded within this area during the hydrological walkover survey. It is therefore considered that the M6 habitats within the Site are sustained by surface water and waterlogging of soils above the low permeability deposits rather than emergent groundwater.
M9	M9 habitats are noted as part of two larger mosaic habitats as part of the NVC survey. These habitats are shown to be underlain by low permeability glacial till deposits. The habitats are also noted along the banks of existing watercourses or within mapped surface water flow paths as shown on the SEPA flood mapping. In addition, three target notes which comprise of M9 habitats were recorded within the NVC survey, one of which are noted within 250m of the Proposed Development (Target Note TN33). TN33 is located within the immediate watercourse corridor of a tributary of the Carron Valley Reservoir. It is therefore considered that M9 habitats are sustained by surface water flow and waterlogging of soils adjacent to watercourses rather than emergent groundwater.
M10	M10 habitats are considered flush features which are at least partially dependent on groundwater, base rich and / or calcareous waters. Three M10 flushes were identified within the NVC survey (Target Note TN31, 33 and 34) all of which are noted within 250m of the Proposed Development within the eastern extent of the Site, near turbine T4. The springs are located on the opposing bank of the unnamed tributary of the Carron Valley Reservoir and as such the water which sustains the M10 habitats are located within a different surface water catchment to the Proposed Development. The watercourse will also act as a hydraulic barrier between the Proposed Development and the water which sustains the flushes. As such the flushes are considered to be hydraulically disconnected from the Proposed Development.
M23	Areas of homogeneous M23 habitats and mosaic habitats which contain M23 are recorded within the centre of the Site and along the northern and south-western boundary of the Site. In addition, several M23 flushes were recorded as part of the NVC survey. M23 habitats are shown to be underlain by low permeability glacial till and areas of peaty soil. In addition, the habitats are shown to comprise of linear features which coincide with existing mapped watercourses, forest rides and within mapped surface water flow paths as shown by SEPA flood mapping. This distribution is not consistent with emergent groundwater such as springs or seepage lines. Therefore, it is considered that the M23 habitats within the Site are predominately sustained by surface water runoff and waterlogging of soils rather than emergent groundwater.



NVC Community	Location and Distribution of Potential GWDTE within the Site and Likely Groundwater Dependency
M27	M27 habitats are noted within two polygons within the southern extent of the Site. These habitats are noted to be underlain by deposits of glacial till and hummocky glacial deposits. Limited groundwater is anticipated within glacial deposits, due to the general low bulk permeability of these deposits. The habitats are also noted along existing watercourse corridors of two tributaries of the Carron Valley Reservoir. This distribution is not consistent with emergent groundwater such as springs or seepage lines. Therefore, it is considered that the M27 habitats within the Site are predominately sustained by surface water runoff and waterlogging of soils rather than emergent groundwater.
M28	M28 habitat forms a small part of a larger M23 mosaic habitat along the south-western boundary of the Site. The habitat is shown to be underlain by low permeability hummocky glacial till deposits. Limited groundwater is anticipated within glacial deposits, due to the general low bulk permeability of these deposits and no emergent groundwater was recorded within this area during the hydrological walkover survey. Therefore, it is considered that the M28 habitats within the Site are predominately sustained by surface water runoff and waterlogging of soils rather than emergent groundwater.
MG10a	An area of MG10 is recorded within the centre of the Site. The habitat is located within an existing forestry ride where drainage features were recorded during the hydrology walkover survey. This distribution is not consistent with emergent groundwater such as springs or seepage lines. Therefore, it is considered that the MG10 habitat within the Site is predominately sustained by surface water runoff and waterlogging of soils connected with artificial drainage of the forestry rather than emergent groundwater.
MG9a	Areas of MG9a are recorded within the south-eastern extent of the Site and along the north-western boundary of the Site. These habitats are shown to be underlain by low permeability glacial till and hummocky glacial deposits. The habitats are also noted along existing watercourse corridors and surface water flow paths shown on the SEPA flood maps. This distribution is not consistent with emergent groundwater such as springs or seepage lines. Therefore, it is considered that the MG9a habitats within the Site are predominately sustained by surface water runoff and waterlogging of soils rather than emergent groundwater.
W4	An area of W4 is recorded within the north-western extent of the Site. The habitat is shown to be underlain by low permeability peat, glacial till and hummocky glacial deposits. Limited groundwater is anticipated within these deposits due to their general low bulk permeability. The habitat is located within an existing forestry ride and no emergent groundwater was recorded within this area during the hydrological walkover survey. It is therefore considered that the W4 habitats within the Site are predominately sustained by surface water runoff and waterlogging of soils rather than emergent groundwater.
W6	An area of W6 is noted within the south-eastern extent of the Site. The habitat is noted to be located on an area of recently planted commercial forestry with significant artificial drainage present. The habitat is also recorded along the banks of an existing watercourse and within a surface water flow path as shown on SEPA flood mapping. This distribution is not consistent with emergent groundwater such as springs or seepage lines. Therefore, it is considered that the W6 habitats within the Site are predominately sustained by surface water runoff and waterlogging of soils adjacent to watercourses rather than emergent groundwater.
W7	W7 habitats are recorded along the northern and southern boundary of the Site. The habitats are shown to be underlain by low permeability peat and hummocky glacial deposits whereby limited groundwater is expected. The habitats are also noted along existing watercourse corridors and surface water flow paths shown on the SEPA flood maps. This distribution is not consistent with emergent groundwater such as springs or seepage lines. Therefore, it is considered that the W7 habitats within the



NVC Community	Location and Distribution of Potential GWDTE within the Site and Likely Groundwater Dependency
	Site are predominately sustained by surface water runoff and waterlogging of soils rather than emergent groundwater.

- 10.4.33 Review of **Table 10-5** shows that the majority of areas of potential GWDTE are underlain by low permeability peat and glacial superficial deposits or are located within existing watercourse corridors and surface water flow paths or in close proximity to artificial drainage networks. This distribution is not typical of that which is sustained by emerging groundwater but rather it is likely to be supported by rainfall, surface water ponding and water logging of soils adjacent to watercourses or above the low permeability deposits.
- 10.4.34 It is concluded that the potential GWDTE habitats are not sustained by groundwater. However, safeguards to maintain these habitats, and sustain the surface water flows and preserve water quality to these habitats, will be implemented during construction and operation of the Proposed Development.
- 10.4.35 M10 flush features have been recorded within the Site however it has been confirmed that these flushes are hydraulically disconnected from the Proposed Development.
- 10.4.36 Any potential impact resulting from the loss of a potential GWDTE habitat as a result of the Proposed Development is discussed in **Chapter 8: Ecology**.

Hydrology

Local Hydrology

- 10.4.37 The hydrology within the Study Area is shown on **Figures 10.1** and **10.2**.
- 10.4.38 The majority of the Site is located within the River Carron surface water catchment, in particular the Carron Valley Reservoir and Earl's Burn sub catchments.
- 10.4.39 The southern extents of the Site are located within the Carron Valley Reservoir sub catchment. The reservoir is located along the southern boundary of the Site and approximately 57.7% of the Site is located within the sub catchment, including wind turbines 3 and 4, the proposed temporary construction compounds, borrow pit, met mast and substation compound.
- 10.4.40 The north-eastern extent of the Site is located within the Earls Burn catchment which flows generally south-west along the north-eastern boundary of the Site before discharging into the River Carron approximately 2.4km east of the Site. Approximately 26.7% of the Site is located within the Earls Burn sub catchment however no development, except for 90m of proposed new access track, is proposed within this catchment.
- 10.4.41 The north western extent of the Site is located within the Endrick Water surface water catchment which is part of the larger River Leven catchment. The Endrick Water flows south and north west approximately 500m north west of the Site at its closest extent. Approximately 15.6% of the Site is located within the Endrick Water catchment including wind turbines T1 and T2.
- 10.4.42 Both the Carron Valley Reservoir and Endrick Water catchments have been designated as a DWPA (see Scottish Water scoping response in **Table 10-1**). In addition, a review of the Scottish Water asset plans confirms that a 400mm public distribution mains pipe is noted along the B818 along the south western boundary of the Site.



Surface Water Flow and Quality

- 10.4.43 The River Carron and Endrick Water are monitored at Headswood approximately 13.5km east (downstream) of the Site and at Gaidrew approximately 20km east (downstream) of the Site respectively. Mean surface water flows are recorded to be 7.743m³/s and 3.585m³/s, respectively.
- 10.4.44 SEPA classify the larger watercourses within the Study Area as part of its responsibility under the WFD. The quality of watercourses relevant to the Site are presented in **Table 10-6**. Smaller watercourses within the Study Area are not monitored and classified by SEPA.

Table 10-6: SEPA Surface Water Classification Data (2024)

Waterbody (SEPA ID)	Overall Status	Overall Ecology	Physio-Chemical	Hydro-morphology	Water Quality	Pressures
Endrick Water [u/s Blane Water] (ID: 10153)	Good	Good	High	Good	Good	None
Carron Valley Reservoir (ID: 100283)	Good ecological potential	Poor	High	Poor	High	Heavily modified waterbody on account of physical alterations that cannot be addressed without a significant impact on water storage for public drinking water.
Earls Burn (ID: 4212)	Good ecological potential	Moderate	High	Moderate	High	Heavily modified waterbody on account of physical alterations that cannot be addressed without significant impact to public water supply.

Fisheries

- 10.4.45 Fisheries within the Study Area are managed by the Forth Rivers Trust (“FRT”) in partnership with the Forth District Salmon Fishery Board (“FDSFB”) and by Loch Lomond Fisheries Trust (“LLFT”). Further details on fisheries are given in **Chapter 8: Ecology**.

Flood Risk

- 10.4.46 SEPA has developed national flood maps that present modelled flood extents for river, coastal, surface water and groundwater flooding. These maps have been developed using a consistent methodology to produce outputs for the whole of Scotland, supplemented with more detailed, local assessments where available and suitable for use.
- 10.4.47 Flood extents are presented in three likelihoods:
- High likelihood: A flood event is likely to occur in the defined area on average more than once in every ten years (1:10). Or a 10% chance of happening in any one year;



- Medium likelihood: A flood event is likely to occur in the defined area on average more than once in every two hundred years (1:200). Or a 0.5% chance of happening in any one year; and
- Low likelihood: A flood event is likely to occur in the defined area on average more than once in every thousand years (1:1,000). Or a 0.1% chance of happening in any one year.

10.4.48 SEPA also has produced reservoir inundation maps for those sites currently regulated under the Reservoirs (Scotland) Act 2011.

10.4.49 SEPA also publish potential future flood extents (to the year 2080 for fluvial and 2070 for pluvial flooding) which account for the potential uplifts in rainfall depths and intensities as a consequence of climate change. An extract of this mapping is shown on **Figure 10.2** and a summary of potential sources of flooding is presented in **Table 10-7**.

Table 10-7: Flood Risk Screening Assessment

Potential Sources	Potential Risk to Site	Justification
Coastal or Tidal Flooding	No	The Site is remote from the coast or any tidally influenced system, and is situated at an elevation of at least 227m AOD. SEPA coastal flood mapping confirms the Site is not at risk from coastal or tidal flooding now or in the future.
Fluvial Flooding	No	SEPA fluvial flood mapping indicates that the entire Site, except for a small area along the north-eastern boundary of the Site near the Earls Burn, is not at risk of fluvial flooding. Fluvial flooding is noted along the banks of the Carron Valley, Endrick Water and Earls Burn however flood extents are not shown to extend beyond the immediate watercourse corridors, and no element of the Proposed Development is shown to be at risk of fluvial flooding now or in the future.
Surface Water and Small Watercourses Flooding	Yes	SEPA surface water and small watercourses (<10km ² catchments) flood mapping confirms that there are floodplains associated with the smaller watercourses and surface water flow paths within the Site. Flood extents generally coincide with existing watercourse corridors or comprise of shallow (<0.3m deep) surface water flow paths towards the existing watercourses and within forestry rides.
Groundwater Flooding	No	SEPA flood maps confirm the Site is not at risk from groundwater flooding. This concurs with the desk-based study which confirms that the Site is underlain by a low productivity aquifer.
Flooding due to dam or reservoir failure	Yes	SEPA reservoir inundation flood mapping confirms that the north-eastern boundary of the Site, near the Earls Burn, is at risk from three breach scenarios from reservoir flooding. Modelled flood extents are shown to be confined to the watercourse corridor of the Earls Burn and no element of the Proposed Development is shown to be at risk from flooding from the breach scenarios.
Flood Defence Breach	No	SEPA mapping indicates that there are no flood defence schemes within the Study Area. Therefore, the Proposed Development is not at risk of flood defence breach.
Flooding due to Artificial Drainage Systems	No	The Site comprises areas of commercial forestry and as such, no large-scale artificial drainage systems are present within the Site which could present a source of flooding.



Private Water Supply

- 10.4.50 As part of this assessment, details of Private Water Supply (“PWS”) sources within the Study Area were obtained from Stirling Council. Additional properties, and potential water users, were also identified following a programme of site-specific field investigation that involved visiting the properties within the Study Area.
- 10.4.51 The risk the Proposed Development poses to PWS sources within the Study Area is presented as **Technical Appendix 10.4**. The assessment has been undertaken in accordance with SEPA’s guidance for assessing the impact on developments on groundwater abstractions.
- 10.4.52 In summary the assessment confirms that neither of the yield nor quality of water at the PWS supplies within the Study Area that have been assessed are considered to be at risk from the Proposed Development.
- 10.4.53 Details of two potential PWS properties are currently unknown, however, the location of these supplies will be confirmed as part of a planning condition prior to the commencement of works.

Licensed Abstractions

- 10.4.54 Review of SEPA’s environmental database indicates that there are four Controlled Activity Regulation (“CAR”) authorisations within the Study Area (see **Figure 10.1**), the details of which include:
- One engineering authorisation for bridging culverts;
 - Two discharges for private sewage discharges; and
 - One reservoir registration for Carron Valley Reservoir.
- 10.4.55 No current or historic licenced abstractions are recorded within the Study Area.

Summary of Sensitive Receptors

- 10.4.56 **Table 10-8** outlines the receptors identified as part of the baseline studies, and their sensitivity based upon previously detailed criteria contained in **Table 10-2**. These receptors form the basis of the assessment, and as per the methodology, are used in conjunction with a magnitude of change to determine significance.

Table 10-8: Summary of Identified Receptor Sensitivity and Justification

Receptor	Sensitivity	Justification for Sensitivity
Water dependent and geological statutory designated sites	High	Endrick Water SSSI and SAC is noted downstream of the Proposed Development with qualifying features which are sensitive to potential changes in water quality and flow / quantity.
Peat and carbon rich soils	Medium	Areas of Class 3 and 5 peatland areas are recorded across the northern extent of the Site and site-specific peat depth probing has confirmed that the majority of peat depths within the Site are <1 m deep.
Superficial and bedrock geology	Not Sensitive	Deposits have been shown to be common regionally and have no rarity value. No designated geological sites are recorded within the Study Area.
Groundwater	High	Groundwater beneath the Site has been classified as Good and vulnerability is classified as Class 4a, 4b and 5.



Receptor	Sensitivity	Justification for Sensitivity
GWDTE	Medium	Areas of potential GWDTE have been identified within the Site by NVC mapping, however, it has been confirmed that these are likely to be sustained by surface water rather than groundwater or will not be impacted by the Proposed Development.
Surface water	High	Watercourses within the Study Area downstream of the Proposed Development have been classified by SEPA as Good overall status.
DWPA	High	The Carron Valley Reservoir and Endrick Water catchments which drain the Site have been designated as DWPA.
Scottish Water assets	High	Scottish Water (see Table 10-1) and the baseline assessment have confirmed that the Proposed Development will cross a Scottish Water distribution pipeline.
Flood risk receptors downstream of the proposed development	Medium	Isolated areas of flooding are recorded on SEPA's future flood maps which are shallow (< 0.3m deep) and / or confined to immediate waterbody corridors.
Private water supplies	Not Sensitive	It has been confirmed (see Technical Appendix 10.4) that none of the PWS sources within the Study Area that have been assessed are considered to be at risk from the Proposed Development. Reasonable attempts would be made as part of the works to discharge any relevant planning condition to confirm the details of the two potential PWS properties which are currently unknown.
Licensed abstractions (CAR)	Not Sensitive	No licenced abstractions have been recorded within the Study Area.

Future Baseline in Absence of Proposed Development

- 10.4.57 Climate change studies predict a decrease in summer precipitation and an increase in winter precipitation alongside slightly higher average temperatures. This suggests that there is likely to be greater pressures on water supplies and lower water levels in summer months in the future. Additionally, summer storms are predicted to be of greater intensity.
- 10.4.58 Peak fluvial and surface water (pluvial) flows associated with extreme storm events may also increase in volume and velocity. Whilst not relevant to this Site, further sea rise is also anticipated.
- 10.4.59 These potential changes are considered in the assessment of effects. Whilst there is uncertainty surrounding the future baseline environment, there are no other anticipated changes on the soils, geology, hydrological or hydrogeological environment throughout the anticipated lifetime of development other than climate change.

10.5 Embedded and Standard Mitigation

Embedded Mitigation

- 10.5.1 Embedded mitigation measures are those measures that are inherent to the Proposed Development. This includes mitigation by design (also known as Primary Mitigation), implemented through design iteration works as described in **Chapter 2: Design Evolution and Alternatives**.



- 10.5.2 The Proposed Development has been designed, as far as possible, to avoid and minimise impacts and effects to geology, peat, hydrology and hydrogeology through the process of design development, and by embedding mitigation measures into the design. This has included using existing access tracks, avoiding areas of peat and carbon-rich soils, areas of potential flooding, PWS sources and groundwater dependent GWDTEs where practically possible, minimising development in riparian corridors and maintaining a buffer to watercourses where practically possible.

Peat Identification and Avoidance

- 10.5.3 The potential presence of peat within the Site formed a key consideration in the layout of the Proposed Development. Informed by the extensive programme of peat depth and condition surveys undertaken across the Site, the design has largely avoided areas of deeper peat (>1m) and areas of unmodified peat (see **Figures 10.6 and 10.7** and **Technical Appendices 10.1 and 10.2**).
- 10.5.4 In accordance with the mitigation hierarchy set out in Policy 5 of the National Planning Framework 4 (NPF4) and detailed in SEPA's planning advice note on assessing the impacts of developments on peatland and carbon rich soils and NatureScot's guidance on advising on peatland habitats and carbon rich soils in development management, the Proposed Development has generally been limited to areas of peat <0.5m deep, where peat is absent or where it has been degraded / previously modified.
- 10.5.5 Existing tracks have been used where possible to reduce the amount of peat excavations.

Watercourse Buffers

- 10.5.6 In accordance with wind farm construction best practice guidance and SEPA consultation advice, a 50m buffer has been applied to all watercourses (as shown on OS 1:10,000 mapping). A 15m buffer has also been applied to minor watercourses identified within the Site in accordance with SEPA's riparian corridor guidance. A commitment has been made to maintain the watercourse buffers in the proposed micro-siting allowance.
- 10.5.7 The design has sought to minimise the number of locations where infrastructure does encroach within the watercourse buffers. As shown on **Figure 10.2**, no infrastructure, except for the proposed watercourse crossing and existing access tracks which could be upgraded (subject to detailed structural assessment), are located within the 50m watercourse buffer.
- 10.5.8 No excavations >1m deep will be required to upgrade the existing access tracks located within the 50m buffer and therefore in accordance with SEPA consultation advice the SEPA riparian corridor buffer can be applied instead of the 50m watercourse buffer. No development, except for the proposed watercourse crossings, are noted within the SEPA riparian corridor buffer.

Watercourse Crossings

- 10.5.9 The Proposed Development has sought to utilise existing tracks where possible. No new watercourse crossings are required to establish the Proposed Developments however, upgrades to six existing watercourse crossings may be required subject to detailed structural assessment which will be completed prior to construction.



- 10.5.10 The locations of the proposed watercourse crossings are shown on **Figure 10.2** and a schedule of the crossing points, which includes photographs and dimensions of each crossing can be found in **Technical Appendix 10.3**.

Private Water Supplies

- 10.5.11 The risk the Proposed Development poses to PWS sources within the Study Area is presented in **Technical Appendix 10.4**. It has been confirmed that none of the PWS sources within the Study Area that have been assessed are at risk from the Proposed Development. Details of the two potential PWS properties are currently unconfirmed, and it is confirmed that the location of any PWS sources will be confirmed as part of a planning condition prior to the commencement of works.
- 10.5.12 It is confirmed that no infrastructure is proposed within 100m of the PWS sources and a commitment has been made to maintain this buffer in the proposed micro-siting allowance.

Standard Mitigation

- 10.5.13 Standard mitigation (also known as Tertiary Mitigation) includes all mitigation usually assumed to be in place during construction, operation and decommissioning, and is generally regarded as industry standard or Best Practice. Committed standard mitigation measures are set out in **Chapter 3: Description of the Development**, the following being specifically applicable to hydrology, hydrogeology, geology and soils.

General Measures

- 10.5.14 As a principle, preventing the release of any pollution/sediment is preferable to dealing with the consequences of any release. There are several general measures which cover all effects assessed within this chapter and the details are given below.
- 10.5.15 Prior to construction, site-specific drainage plans would be produced. These would consider any existing local drainage which may not be mapped and incorporate any site-specific mitigation measures identified during the assessment.
- 10.5.16 Measures would be included in the final CEMP for dealing with potential pollution, sedimentation and flood risk incidents and would be developed prior to construction. This would be adhered to should any incident occur, reducing the effect as far as practicable.
- 10.5.17 The final CEMP would contain details on the location of spill kits, would identify 'hotspots' where pollution may be more likely to originate from; provide details to site personnel on how to identify the source of any spill and state procedures to be adopted in the case of a spill event. A suitably qualified and experienced specialist spill response contractor would be identified to deal with any major environment incidents. This could be the Principal Contractor if this suitable qualification and experience can be demonstrated prior to contract award.
- 10.5.18 The final CEMP would be secured by a planning condition prior to construction commencing. Mitigation measures outlined in the final CEMP would also form measures to be adopted as part of a longer-term Operational Environmental Management Plan ("OEMP"), as required.
- 10.5.19 A wet weather protocol would be developed. This would detail the procedures to be adopted by all staff during periods of heavy rainfall. Toolbox talks would be given to engineering, construction and supervising personnel.



- 10.5.20 Roles would be assigned to site staff, and the inspection and maintenance regimes of sediment and runoff control measures would be adopted during these periods. In extreme cases, this protocol will dictate that work on Site may have to be temporarily suspended until weather or ground conditions allow.

Ecological / Environmental Clerk of Works

- 10.5.21 To ensure all reasonable precautions are taken to avoid negative effects on soil, peat and the water environment, a suitably qualified ECoW would be appointed prior to the commencement of construction to advise the Applicant and the Principal Contractor on ecological and hydrological matters.
- 10.5.22 The ECoW would be required to be present on-site during the construction phase and will carry out monitoring of works and briefings with regards to any ecological and hydrological sensitivities on the Site to the relevant staff of the Principal Contractor and subcontractors.
- 10.5.23 With respect to the water environment, the ECoW would also have responsibility for ensuring that surface water flow paths and the quality of water supporting water dependent habitats are sustained and protected during all phases of construction of the Proposed Development.

Safeguarding of Peat and Carbon-rich Soils

- 10.5.24 The peat depth probing data has confirmed that the Proposed Development is underlain by mineral soils or peaty soils (where peat depths are <0.5m deep) and the Proposed Development has avoided areas of deeper peat (>1m deep).
- 10.5.25 The peat depth probing data has been used to determine the volume of soil and peat which will be disturbed by the Proposed Development. This data has been used to prepare a site-specific outline SPMP (**Technical Appendix 10.2**) which details the volume of acrotelmic and catotelmic peat which will be disturbed and how this will be safeguarded. Mitigation and good practice construction methodologies is also detailed in **Technical Appendix 10.2**.
- 10.5.26 No surplus peat will be generated, and the volumes of peat / carbon rich soils generated from the proposed excavations would be used to reinstate track verges, borrow pits, temporary hardstanding areas and as part of habitat and peat restoration plans.
- 10.5.27 **Technical Appendix 10.1** also confirms that there are limited areas of peat instability risk across the Proposed Development and that, through the implementation of standard mitigation measures, all identified risks can be mitigated.
- 10.5.28 Detailed design and construction practices will need to consider the particular ground conditions and the specific works at each location throughout the construction period. An experienced and qualified engineering geologist or geotechnical engineer will be appointed, to provide advice during the setting out, micro-siting and construction phases of the Proposed Development. Where micro-siting allowances exist, any movements of infrastructure would ensure the avoidance of peat if encountered, supported by intrusive ground investigations which will be undertaken post consent, prior to construction.

Water Quality Monitoring

- 10.5.29 Water quality monitoring before, during construction and post construction will be undertaken at the watercourses which drain the Site to ensure that none of the



- watercourses are carrying pollutants or suspended solids. Monitoring would be carried out at a specified frequency (depending upon the construction phase).
- 10.5.30 Monitoring would continue throughout the construction phase and immediately post construction. Monitoring would be used to allow a rapid response to any pollution incident as well as assess the impact of good practice or if remedial measures to improve water quality were implemented.
- 10.5.31 Monitoring frequency would increase during the construction phase if remedial measures to improve water quality were implemented. The performance of the good practice measures would be kept under constant review by the water monitoring schedule, based on a comparison of data taken during construction with a baseline data set, sampled prior to the construction period.
- 10.5.32 Water quality monitoring plans would be developed during prior to construction, and it is expected the monitoring programme would be secured by a pre-development planning condition to be agreed with statutory consultees including Stirling Council and Scottish Water.

Works Within Watercourse Buffers

- 10.5.33 Except for the proposed watercourse crossings, there is approximately 50m of existing access track which could be upgraded (subject to detailed structural assessment) that encroaches into the 50m watercourse buffer. No excavations >1m deep would be required to upgrade the access tracks located within the 50m buffer and therefore in accordance with SEPA consultation advice the SEPA's riparian corridor buffers can be applied instead of the 50m watercourse buffer. However, it is noted that at these locations, additional safeguards would be deployed and included in the final CEMP, and subject to agreement with Stirling Council. These would include, but are not limited to the following:
- Induction and training for staff highlighting sensitivities;
 - A wet weather working protocol and provision to cease works during prolonged rainfall or periods of high runoff (pluvial or fluvial);
 - Reduction in extent of working area to minimise the potential to disturb ground;
 - Additional passive water quality control measures, such as temporary water diversion ditches, silt fences, and silt traps to control and treat runoff from working areas;
 - Daily inspection of works and watercourses and full-time supervision of construction and restoration and works;
 - Deployment of real-time water quality monitoring telemetry with predetermined water quality trigger levels based on baseline water quality data (e.g. for pH, dissolved oxygen and electrical conductivity): and
 - Documentation that clearly identifies responsibilities and actions and contact details should a pollution event be recorded.

Pollution Risk

- 10.5.34 Good practice measures in relation to pollution prevention, which would be included in the final CEMP, would include the following:
- Refuelling would take place in designated areas which will be take place at least 50m from watercourses and where possible it would not occur when there is risk that oil from a spill could directly enter the water environment;



- Foul water generated on-site would be managed in accordance with best practice and be drained to a sealed tank and routinely removed from site;
- A vehicle management plan and speed limit would be strictly enforced on-site to minimise the potential for accidents to occur;
- Drip trays would be placed under stationary vehicles which could potentially leak fuel/oils;
- Areas which would be designated for washout of vehicles are a minimum distance of 50m from a watercourse;
- Washout water would also be stored in the washout area before being treated and disposed of;
- No direct or indirect discharges to watercourses without prior treatment in buffer zones or adjacent to proposed infrastructure;
- Water would be prevented as far as possible, from entering excavations;
- Procedures would be adhered to for storage of fuels and other potentially contaminative materials in line with the Environmental Authorisation (Scotland) Regulations (“EASR”), to minimise the potential for accidental spillage. This would be included in the final CEMP and OEMP; and
- A plan for dealing with spillage incidents would be designed prior to construction, and this would be adhered to should any incident occur, reducing the effect as far as practicable. This would be included in the final CEMP and OEMP.

10.5.35 Site investigation (e.g., trial pitting and/or boreholes) will be undertaken prior to any construction works where excavation will be required to construct the Proposed Development. The Site investigation would inform detailed design and construction methods of the Proposed Development to ensure pollution risk is further considered and minimised prior to construction.

Erosion and Sedimentation

10.5.36 Good practice measures for the management of erosion and sedimentation would include the following:

- All stockpiled materials would be located out with a 50m buffer from watercourses, including on up gradient sides of tracks and battered to limit instability and erosion;
- Where possible, stockpiled material would either be seeded or appropriately covered, minimising the area of exposed bare ground;
- Monitoring of stockpiles/excavation areas during extreme rainfall events;
- Water would be prevented as far as possible, from entering excavations through the use of appropriate cut-off drainage;
- Where this is not possible, water that enters excavations would pass through a number of settlement lagoons and silt/sediment traps to remove silt prior to indirect discharge into the surrounding drainage system. Detailed assessment of ground conditions would be required to identify locations where settlement lagoons would be feasible;
- Clean and dirty water on-site would be separated and dirty water would be filtered before entering the water environment;



- If the material is stockpiled on a slope, silt fences would be located at the toe of the slope to reduce sediment transport;
- The amount of ground exposed, and time period during which it is exposed, would be kept to a minimum and appropriate drainage would be in place to prevent surface water entering deep excavations;
- A design of drainage systems and associated measures to minimise sedimentation into natural watercourses would be developed - this may include silt traps, check dams and/or diffuse drainage;
- Silt/sediment traps, single size aggregate, geotextiles or straw bales would be used to filter any coarse material and prevent increased levels of sediment. Further to this, activities involving the movement or use of fine sediment would avoid periods of heavy rainfall where possible; and
- Construction personnel, the Principal Contractor and the ECoW would carry out regular visual inspections of watercourses to check for suspended solids in watercourses downstream of work areas.

Sustainable Drainage Systems (SuDS)

- 10.5.37 SuDS will be incorporated as part of the Proposed Development and included as part of a detailed drainage design which will be developed further as part of the final CEMP and would be agreed with Stirling Council, Scottish Water and SEPA prior to construction.
- 10.5.38 SuDS techniques aim to mimic pre-development surface water runoff conditions and balance or throttle flows to the rate of surface water runoff that might have been experienced at the Site prior to development. Good practice in relation to the management of surface water runoff rates and volumes and potential for localised surface water flood risk would include the following:
- Drainage systems would be designed to ensure that any sediment, pollutants or foreign materials which may cause blockages are removed before water is discharged into a watercourse;
 - On-site drainage would be subject to routine checks to ensure that there is no build-up of sediment or foreign materials which may reduce the efficiency of the original drainage design;
 - Drainage systems deployed would attenuate runoff rates and reduce runoff volumes to mitigate potential increase in downstream flood risk;
 - Where necessary, check dams would be used to reduce the flow velocity and attenuate the rate of runoff shed from site; and
 - As per good practice for pollution and sediment management, prior to construction, site-specific drainage plans would be developed and construction personnel made familiar with the implementation of these.

Water Abstractions and Dewatering

- 10.5.39 If water abstraction, for example to provide a source of water for dust suppression during construction, is required, a potential source will be identified at the detailed design stage of the project and following site investigation. An application for an EASR authorisation would then be made to SEPA and works would be undertaken in accordance with the granted EASR. Should a suitable source not be identified, a water bowser would be used.
- 10.5.40 Good practice that would be followed in addition to the EASR regulations includes:



- Planning of water use so as to minimise abstraction volumes;
- Reuse of water where possible;
- Recording of abstraction volumes; and
- Control of abstraction rates to prevent significant water depletion in a source.

10.5.41 Any temporary dewatering required to facilitate construction will also be undertaken in accordance with the appropriate EASR general binding rule (“GBR”).

Watercourse Crossings

10.5.42 Review of 1:10,000 scale watercourse mapping confirms that upgrades to six existing watercourse crossings may be required subject to detailed structural assessment, as shown on **Figure 10.1** and detailed further in **Technical Appendix 10.3**.

10.5.43 Any upgraded crossings will be designed to pass the 1 in 200-year flood event, including an allowance for climate change, and the design and construction details will be agreed with SEPA and Stirling Council as part of the final CEMP.

10.5.44 During the operation of the Proposed Development, the OEMP will be implemented which will include routine inspection and clearing of the watercourse crossings throughout the operational phase of the Proposed Development.

Forestry Felling

10.5.45 Forestry felling will be required to facilitate the Proposed Development. Details of forestry felling are presented in **Technical Appendix 3.2. Table 10-9** compares the proposed felling areas within the Site to the surface water catchments in which they will occur.

Table 10-9: Forestry Felling and Water Catchment Areas

Catchment	Total Water Catchment Area (km ²)	Proposed Forestry Felling Area (km ²)	Percentage of Catchment
Carron Valley Reservoir	38.94	0.26	0.7
Earls Burn	15.30	0.02	0.1
Endrick Water	117.56	0.10	0.1

10.5.46 **Table 10-9** shows that the felling required to establish the Proposed Development is very small (<1%) compared to the overall surface water catchments and is below the UK Forestry guidance thresholds (20% of total catchment area within a 3-year period) and therefore no impact on water quality, including potential acidification effects, or increased flood risk is anticipated as a result of any required felling activities. This will be confirmed by the proposed water monitoring programme.

10.5.47 Forestry works will be undertaken in accordance with industry good practice as discussed in **Technical Appendix 3.2**.

Concrete Pouring

10.5.48 As part of Site investigation works, which will be undertaken as part of the detailed design stage, the ground conditions would be assessed to inform the concrete design which will be used to facilitate the Proposed Development in accordance



with best practice. The turbine foundation design will ensure that the concrete specification used is appropriate for the environment to minimise degradation and leaching into the surrounding soil and water environment. If necessary, the excavations would incorporate an adequate barrier to prevent the movement of any on-site pollutants to the underlying soils, groundwater and surface water environment.

- 10.5.49 These methods will be specified in the final CEMP, and the proposed concrete design will be agreed with SEPA prior to construction.

10.6 Scope of Assessment

- 10.6.1 **Table 10-10** provides a summary of which receptors and impacts have been scoped in or out of the assessment during the construction and operation phases of the Proposed Development.
- 10.6.2 As set out in **Chapter 2: Design Evolution and Alternatives**, effects associated with the construction phase can be considered to be representative of reasonable worst-case decommissioning effects, therefore no separate assessment of the decommissioning phase is presented in this chapter.

Table 10-10: Summary of Assessment Scope

Receptor/Impact	Scoped In?		Comments
	Construction	Operation	
Potential impact on geological and water dependent designated sites.	Yes	Yes	Endrick Water SSSI and SAC is located downstream of the Proposed Development with qualifying features that are highly sensitive to potential changes in water quality and flow / quantity which without appropriate controls could be impacted by the Proposed Development.
Degradation of peat and carbon-rich soils	Yes	No	Peat and peaty soils have been recorded within the Site which could be degraded during construction of the Proposed Development. No excavation, movement or storage of peat or carbon-rich soils is anticipated during the operational life of the Proposed Development and therefore, no impacts are anticipated.
Potential impacts on superficial deposits and bedrock geology.	No	No	The superficial and bedrock geology is common regionally and there are no protected geological features within the Site. Whilst there will be effects arising from track construction, borrow pits and for turbines and crane hardstandings, these are limited in area and do not extend beyond the immediate footprint of the Proposed Development. Furthermore, the nature of the activities during construction and operation of the



Receptor/Impact	Scoped In?		Comments
	Construction	Operation	
			Proposed Development would not alter regional superficial or bedrock geology.
Potential impacts on GWDTEs.	No	No	The baseline assessment confirms that all potential areas of GWDTE are considered to be sustained by rainfall and surface water rather than emergent groundwater. Subject to adoption of good practice measures, including an appropriate drainage plan to maintain surface water flow paths, no effects on the water which sustains GWDTE areas within the Site are anticipated.
Generation of pollution impairing water quality of surface water catchments and groundwater bodies.	No	No	Subject to adoption of embedded mitigation (50m watercourse buffer and SEPA's riparian corridor buffers in accordance with SEPA consultation advice) and adherence to good practice industry standards no effects are anticipated. Good practice will be adopted through a CEMP and OEMP which will be agreed with Stirling Council prior to construction commencing.
Increased erosion and sediment load to receiving watercourses.	No	No	
Potential effects on catchment wide surface water and groundwater levels and flow.	No	No	Mitigation measures including a detailed drainage design will be adopted to maintain existing surface water flow paths and levels. Any temporary abstractions or dewatering required to construct the Proposed Development will be undertaken and regulated in accordance with EASR which will be agreed with SEPA prior to construction.
Increased acidification in receiving watercourses from forestry felling.	No	No	It has been shown that felling required to facilitate the Proposed Development is within industry guidance and subject to adoption of good practice, no impacts are expected.
Potential impacts on DWPAs	Yes	Yes	The baseline assessment and correspondence with Scottish Water have confirmed that the Carron Valley and Endrick Water catchments have been classified as DWPAs and which without appropriate controls could be impacted by the Proposed Development.



Receptor/Impact	Scoped In?		Comments
	Construction	Operation	
Potential impacts to Scottish Water distribution mains pipeline	Yes	No	The baseline assessment and Scottish Water scoping response has confirmed that the Proposed Development will cross a mains distribution pipeline, which without appropriate controls could be impacted by the construction of the Proposed Development. No excavations is anticipated near the mains pipeline during the operational life of the Proposed Development and therefore, no impacts are anticipated.
Increased flood risk to downstream receptors.	No	No	Subject to adoption of a detailed drainage design, which incorporates the use of SuDS and an appropriate management of the drainage system no increase in flooding is expected as a result of the Proposed Development.
Potential impacts on PWSs	No	No	In accordance with SEPA's guidance, no PWS sources which have been assessed are considered to be at risk from the Proposed Development (see Technical Appendix 10.4). Subject to adoption of embedded mitigation (100m buffer) and adherence to good practice no effects are anticipated.
Potential impacts on licenced abstractions	No	No	The baseline assessment has confirmed that no licenced abstractions are recorded within the Study Area and therefore no potential effects are anticipated.

10.7 Assessment of Potentially Significant Effects

Construction

Water Dependent Designated Sites (Endrick Water SSSI and SAC)

- 10.7.1 Endrick Water SSSI and SAC is located within the same surface water catchment as the Proposed Development and are therefore hydrologically connected to the Proposed Development. The SSSI and SAC has been designated for qualifying features which are highly sensitive to potential changes in water quality and quantity which without appropriate controls could be impacted by the Proposed Development.
- 10.7.2 It is confirmed (see **Figure 10-1** and **10-2**) that no development is proposed within 50m of the watercourses within the Endrick Water surface water catchment, reducing the potential risk for a pollution event or increased sediment loads to occur within the watercourses in this catchment during construction.



- 10.7.3 Good practice measures to control water quality and flow / quantity, including the use of an ECoW and appropriate pollution prevention measures outlined in Section 10.5 and in accordance with NatureScot's '*Good practice during windfarm construction*' guidance will be outlined in the final CEMP. These will be used to ensure that existing surface water quality and quantity of the water which drains to the Endrick Water SSSI and SAC is maintained.
- 10.7.4 It is also proposed that the watercourses which drain the Endrick Water within the Site are included in the proposed water quality and level monitoring programme to confirm that the Proposed Development does not have a significant effect on the water environment which sustains the designated sites.
- 10.7.5 Water dependent designated sites are considered high sensitivity receptors. With the good practice construction techniques to protect the quality and quantity of surface water and groundwater receptors, in combination with the proposed monitoring programme the potential impact is assessed as negligible, and the resultant significance of effect is assessed as **negligible** and **not significant**.

Peat and Carbon Rich Soils

- 10.7.6 Without appropriate mitigation, there is potential for the Proposed Development to degrade peat habitats and carbon-rich soils and impact the carbon store and hydrological function of the peatlands. Degradation may occur through inappropriate handling of peat deposits during construction, local lowering of the water table to facilitate excavations associated with construction works and the concentration of surface water flow as a result of construction of the Proposed Development so that peat becomes eroded. Construction in unstable areas could also potentially increase ground instability resulting in peat slides.
- 10.7.7 It has been shown (**Technical Appendix 10.1** and **Technical Appendix 10.2**) that the Proposed Development will avoid peat deposits >1m deep and that the disturbance of peat and carbon-rich soils as a result of construction of the Proposed Development can be minimised. A Soil and Peat Management Plan ("SPMP") would form part of the final CEMP which would ensure that the disturbance of carbon-rich soils and shallow peat deposits can be minimised, and these deposits can be safeguarded. In addition, location specific drainage plans and good practice measures will form part of the final CEMP and will be used to maintain existing hydraulic connectivity to the peat deposits and minimise potential drainage and dewatering effects.
- 10.7.8 Peat and carbon-rich soils are considered medium sensitivity receptors. With the implementation of recommended best practice measures to be outlined in the final CEMP, the potential impact on these deposits is assessed as negligible. Consequently, the overall significance of the effect is also **negligible** and therefore considered **not significant**.

Drinking Water Protected Areas

- 10.7.9 The baseline assessment and consultation with Scottish Water (**Table 10-1**) have confirmed that Endrick Water and Carron Valley Reservoir catchments have been designated as strategically important DWPA's. Elements of the Proposed Development are proposed within both catchments and therefore without appropriate controls there is potential for adverse impacts to the watercourses within the DWPA's during construction of the Proposed Development.
- 10.7.10 Further consultation (see **Table 10-1**) with Scottish Water has confirmed that the abstraction points used for public water supply within the DWPA catchments are



at a sufficient distance from the Proposed Development that no impacts are expected.

- 10.7.11 In addition, embedded mitigation and good practice measures to control water quality and flow / quantity, outlined in Section 10.5, will be used to ensure that existing surface water quality and quantity of the water within the DWPA catchments are maintained.
- 10.7.12 It is also proposed that the watercourses within the DWPA catchments are included in the proposed water quality and level monitoring programme to confirm that the Proposed Development does not have a significant effect on the water environment which sustains the designated sites. The monitoring programme will be agreed with Scottish Water prior to construction commencing.
- 10.7.13 Endrick Water and Carron Valley Reservoir DWPA's are considered high sensitivity receptors. With the good practice construction techniques to protect the quality and quantity of surface water within the DWPA catchments, in combination with the proposed monitoring programme the potential impact is assessed as negligible, and the resultant significance of effect is assessed as **negligible** and **not significant**.

Scottish Water Distribution Pipelines

- 10.7.14 The baseline assessment has confirmed that there is a Scottish Water distribution mains pipeline along the B818 within the southern boundary of the Site. The proposed upgraded Site entrance from the B818 will cross the distribution pipeline and therefore any upgrades of the existing access track near the B818 could impact the distribution pipeline.
- 10.7.15 As part of the detailed design stage for the Proposed Development, prior to construction commencing, the location of the Scottish Water distribution pipework would be confirmed and clearly marked. If necessary, protection measures would be agreed with Scottish Water to ensure infrastructure integrity is maintained, which will form part of the final CEMP as required.
- 10.7.16 Scottish Water distribution pipes are considered high sensitivity receptors. Subject to adoption of further structural analysis to locate the pipeline and adoption of appropriate mitigation measures the potential impact is considered negligible. The significance of effect is therefore **negligible** and **not significant**.

Operation

Water Dependent Designated Sites (Endrick Water SSSI and SAC)

- 10.7.17 During operation the possibility for a pollution event in the watercourses which drain the Endrick Water SSSI and SAC is considered unlikely. There will be a limited number of vehicles required on Site for routine maintenance and for the operation of the Proposed Development. Storage of fuels/oils on Site would be limited to the hydraulic oil required in wind turbine gearboxes.
- 10.7.18 Storage and handling of potential pollutants will be handled in accordance with good practice and regulated in accordance with the EASR. Appropriate drainage measures adopted during construction, incorporating sediment traps, will be remain to maintain existing water flow rates and reduce the potential for increased delivery of sediment to watercourses.
- 10.7.19 Should any non-routine maintenance be required at sections of track crossing wet areas (defined visually on-site by a contractor or operational personnel) there will be potential for erosion and sedimentation effects to occur due to the existence of



disturbed material. Should this type of activity be required, then the good practice measures as detailed for the construction phase will be required on a case by case basis. Extensive work at water crossings or adjacent to the water environment may require approval from SEPA under the EASR (depending upon the nature of the activity).

- 10.7.20 The good practice measures set out in the final CEMP, as detailed in Section 10.5, would be adopted through the OEMP and will afford protection of watercourses which drain to the Endrick Water SSSI and SAC during the operational phase of the Proposed Development.
- 10.7.21 The Endrick Water SSSI and SAC is considered a high sensitivity receptor. Subject to adoption of good practice measures, incorporated through an OEMP, the potential impact is considered negligible. The significance of effect is therefore **negligible** and **not significant**.

Potential Effects on DWPA

- 10.7.22 The controls which would be adopted during the construction phase of the Proposed Development to safeguard water quality and quantity, which are in accordance with good practice measures outlined in Section 10.5, would be adopted through the OEMP. This will ensure that the existing surface water quality and quantity is maintained throughout the operation of the Proposed Development.
- 10.7.23 The potential impact is therefore considered negligible and thus the significance of effect on identified receptors (which are considered as high sensitivity receptor) is **negligible** and **not significant**.

10.8 Additional Mitigation and Enhancement

- 10.8.1 Table 10-**Table 10-11** sets out additional mitigation measures (also known as secondary mitigation, comprising measures beyond embedded/standard mitigation) and enhancement measures to which the Applicant has committed. These measures are designed to reduce identified adverse effects and/or to enhance beneficial effects.

Table 10-10: Additional (Secondary) Mitigation and Enhancement

Reference	Mitigation/ Enhancement Measure	Description
ECO1	Outline Habitat Management Plan	Habitat management plan (see Technical Appendix 8.6) which includes measures to improve peatland within the Site.
HYDRO1	Water Quality Monitoring	A programme of water monitoring is proposed prior to any construction activity, during construction and immediately post construction of the Proposed Development. The monitoring programme would be agreed with Stirling Council and Scottish Water and is expected to include monitoring of the watercourses which drain from the site to ensure there are no effects to the water environment. The water quality monitoring plan will be secured by a planning condition should the Proposed Development be consented.



10.9 Residual Effects

- 10.9.1 No significant residual effects on, hydrology, hydrogeology, geology or soils (including peat) receptors are predicted during the construction or operational phases of the Proposed Development.

10.10 Cumulative Assessment

- 10.10.1 The assessment also considers potential cumulative effects associated with other developments within 5km of the Site and in the same surface water catchments as the Proposed Development. A cumulative effect is considered to be the effect on a geological, peat, hydrological or hydrogeological receptors arising from the Site in combination with any other developments which are likely to affect soils, geology, surface water and or groundwater.
- 10.10.2 The following developments are located within 5km and in the same surface water catchment as the Proposed Development (see **Figure 7.12**):
- Craignannet Wind Farm (operational), located within the Earls Burn catchment;
 - Craigengelt Wind Farm (operational) location particularly within the Earls Burn catchment upstream of the Proposed Development;
 - Earlsburn Wind Farm (operational), located within the Earls Burn and Endrick Water catchments upstream of the Proposed Development;
 - Earlsburn North Wind Farm (operational), located within the Earls Burn and Endrick Water catchment upstream of the Proposed Development;
 - Earlsburn Windfarm Extension (consented), located the Earls Burn catchment, upstream of the Proposed Development; and
 - Shelloch Wind Farm (consented), located within the Endrick Water catchment upstream of the Proposed Development.
- 10.10.3 Much of the cumulative situation of the Proposed Development comprises operational developments, for which cumulative effects on hydrology, hydrogeology and soils are anticipated to be minimal, as operational phase effects on hydrological, hydrogeological and geological receptors are generally negligible.
- 10.10.4 The consented schemes will be constructed and maintained in accordance with good practice, industry standards and relevant legislation, planning policy and guidance regulated by statutory consultees. These standards, with respect to geology, peat, hydrology and hydrogeology, are designed to mitigate potential impacts and control them at source.
- 10.10.5 The potential cumulative impact is therefore considered negligible and the potential effect on identified receptors is **negligible** and **not significant**.

10.11 Summary and Statement of Significance

- 10.11.1 An assessment of the potential effects of the Proposed Development on hydrology, hydrogeology, geology and soils (including peat) within a defined Study Area (comprising land within 500m of the Site boundary) has been undertaken. The assessment has considered the construction and operational phases of the Proposed Development.
- 10.11.2 The Proposed Development design has been informed by site-specific surveys that have been used to verify the findings of a comprehensive desk study and identify key receptors.



- 10.11.3 Embedded mitigation and industry standard good practice measures have been identified that afford protection to the water environment. In addition, a site-specific CEMP and OEMP has been committed.
- 10.11.4 It has been shown, as a consequence of the design of the Proposed Development and with the adoption of industry standard good practice, delivered through a skilled team of competent workers, with mitigation and compliance monitored in collaboration with SEPA, Stirling Council, Scottish Water and other engaged stakeholders, the significance of effects on all identified receptors is considered to be negligible and are not defined as significant in the context of the EIA Regulations.
- 10.11.5 A summary of the assessed receptors and identified mitigation measures required to reduce the potential effects to acceptable levels is identified in **Table 10-11**.



Table 10-11: Summary Table

Description of Effect	Mitigation/Enhancement Measure(s)	Significance of Residual Effect	
		Level and Significance	Beneficial/ Adverse
During Construction & Decommissioning			
Potential adverse effects on water which sustains Endrick Water SSSI and SAC.	- Mitigation by design including suitable buffers to watercourses. - Adherence to good practice measures which will be adopted through a final CEMP which will be submitted with written approval of Stirling Council. - Confirmatory water quality monitoring, the scope and frequency of which will be agreed with Stirling Council prior to construction commencing.	Negligible / Not Significant	Neutral
Degradation of peat and carbon rich soils through lowering of the water table.	- Mitigation by design by avoiding areas of deep peat and adherence to good practice measures. - Adoption of a SPMP which will be outlined in the final CEMP with written approval of Stirling Council.	Negligible / Not Significant	Neutral
Potential adverse effects on the Endrick Water and Carron Valley DWPA's.	- Adherence to good practice mitigation measures which will be adopted through a final CEMP which will be submitted with written approval to Stirling Council. - Confirmatory water quality monitoring, the scope and frequency of which will be agreed with SC and Scottish Water prior to construction commencing.	Negligible / Not Significant	Neutral
Potential adverse effects on Scottish Water distribution pipelines.	Commitment to complete a structural analysis and confirm the location of the pipework prior to construction commencing, in consultation with Scottish Water.	Negligible / Not Significant	Neutral



Description of Effect	Mitigation/Enhancement Measure(s)	Significance of Residual Effect	
		Level and Significance	Beneficial/ Adverse
During Operation			
Potential adverse effects on water which sustains Endrick Water SSSI and SAC.	Adherence to good practice measures outlined in the final CEMP and adopted through an OEMP.	Negligible (Not Significant)	Neutral
Potential adverse effects on Endrick Water and Carron Valley Reservoir DWPA's.	Adherence to good practice measures outlined in the final CEMP and adopted through an OEMP.	Negligible (Not Significant)	Neutral
Cumulative Effects			
No cumulative effects are anticipated as a result of the Proposed Development.			



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10.13 Abbreviations List

Abbreviation	Meaning
AOD	Above Ordnance Datum
BGS	British Geological Survey
CAR	Controlled Activity Regulations
CEMP	Construction Environmental Management Plan
CIRIA	Construction Industry Research and Information Association
DWPA	Drinking Water Protected Area
DWQR	Drinking Water Quality Regulator
EASR	Environmental Authorisation (Scotland) Regulations
ECOW	Ecological Clerk of Works
EIA	Environmental Impact Assessment
FDSFB	Forth District Salmon Fishery Board
FRT	Forth Rivers Trust
FMS	Fisheries Management Scotland
GBR	General Binding Rules
GCR	Geological Conservation Review
GWDTE	Groundwater Dependent Terrestrial Ecosystem(s)



Abbreviation	Meaning
HRA	Habitats Regulations Appraisal
km	kilometre
LLFT	Loch Lomond Fisheries Trust
m	metre(s)
NGR	National Grid Reference
NPF4	National Planning Framework 4
NVC	National Vegetation Classification
OEMP	Operational Environmental Management Plan
OS	Ordnance Survey
PLHRA	Peat Landslide and Hazard Risk Assessment
PVA	Potential Vulnerable Area
PWS	Private Water Supply
PWSRA	Private Water Supply Risk Assessment
SAC	Special Area of Conservation
SEPA	Scottish Environment Protection Agency
SPMP	Soil and Peat Management Plan
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Drainage Systems
WFD	Water Framework Directive
Zol	Zone of Influence



Making Sustainability Happen



Chapter 11: Archaeology and Cultural Heritage

Environmental Impact Assessment Report

Cairnoch Hill Wind Farm

3 August 2026



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11.0 Archaeology and Cultural Heritage

11.1 Introduction

- 11.1.1 This chapter presents the assessment of the likely significant effects, in accordance with the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 (“the EIA Regulations”), on Archaeology and Cultural Heritage Receptors arising from the proposed Cairnoch Hill Wind Farm (“the Proposed Development”) during construction, operation and decommissioning.
- 11.1.2 Cultural Heritage is defined by Historic Environment Scotland as “*an expression of the ways of living developed by a community and passed on from generation to generation. It can include customs, practices, places, objects, artistic expressions and values, aesthetic, historic, scientific, social or spiritual aspects*” (Historic Environment Scotland, 2019a). 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.
- 11.1.3 The cultural heritage impact assessment identifies cultural heritage assets that may be subject to significant effects, both within the footprint of the infrastructure of the Proposed Development and within a surrounding radius of 10km; it establishes the potential for currently unknown archaeological assets to survive buried within the area of the Proposed Development (“the Site”); assesses the predicted effects on these assets; and proposes a programme of mitigation where appropriate. It considers direct effects (such as physical disturbance or effects through setting change), indirect effects (such as might result from dewatering), and cumulative effects (where assets affected by the Proposed Development are also likely to be affected by other development proposals of a similar nature). The proposed approach to the assessment of effects on cultural heritage is set out in Section 11.3.
- 11.1.4 The assessment has been carried out by Erin Ashby MSc ACIfA, Senior Heritage Consultant, of SLR Consulting Ltd. The chapter has been reviewed and approved by Beth Gray, MA (Hons) MCIfA, Principal Heritage Consultant.
- 11.1.5 This chapter is supported by:
- **Technical Appendix 11.1: Gazetteer of Heritage Assets within 1km of the Proposed Development;**
 - **Technical Appendix 11.2: Cultural Heritage Appraisal;** and
 - **Figures 11.1 to 11.10.**
- 11.1.6 The assessment has been undertaken in accordance with relevant policy, legislation and guidance as standard for similar development proposals in this area. Legislation, guidance and policy relevant to this assessment is detailed in **Technical Appendix 4.1: Legislation, Guidance and Policy**, and in the summary to this chapter.
- 11.1.7 An appraisal of the Proposed Development’s compliance with relevant policy is given in the separate, standalone **Planning Statement** provided as part of the suite of planning application documents and the relevant heritage assets are also discussed in the Landscape and Visual Impact Assessment (LVIA) presented in **Chapter 7** of this EIA Report.



- 11.1.8 The LVIA focuses on a development's visibility from a location, such as a heritage asset, and the effect that visibility has on visitors to that location, in other words on visual amenity.
- 11.1.9 In contrast, the cultural heritage assessment focuses on effects to the cultural significance of heritage assets. Each assessment therefore considers different types of receptors (people vs. cultural significance) and effects and can come to differing conclusions on levels of effect relating to the same receptor.]

11.2 Consultation

- 11.2.1 Consultation, relevant to cultural heritage and archaeology, was undertaken with relevant bodies during the EIA process. In undertaking the assessment, consideration has been given to the scoping response and other consultation undertaken as outlined in **Table 11-1**.

Table 11-1: Summary of Consultation

Consultation Details	Consultee Comments	Applicant Response
Stirling Council		
Stirling Council (Pre-Application Advice 6 August 2024)	Stirling Council notes that there would be a setting impact on Sir John de Graham's Castle (SM4278), acknowledging that the setting is already quite compromised by woodland. The asset would need to be assessed fully, and effort should be taken to keep impacts to a minimum. Stirling Council acknowledge that there may be physical impacts, but as the site has been afforested these are not foreseen. They note that there is a potential for prehistoric lithic working, but it is expected that this could be dealt with by four 1m by 1m hand dug and sieved test pits (one at each turbine base). If the test-pits found anything then it is likely that further exploratory works would be required.	The Site boundary was subsequently adjusted to exclude Sir John de Graham's Castle (SM4278) in order to avoid any potential for direct impacts. Furthermore, the closest wind turbine (T1) has been moved approximately 750m north east in order to reduce impacts on setting, meaning that it is now approximately 1.1km north east of the asset. The asset has also been taken forward for further assessment on potential impacts on its setting and is discussed in Section 11.7. The archaeological potential of the Site is outlined in Section 11.4. The assessment of direct significant impacts can be found in Section 11.7. Mitigation is proposed in Section 11.9, and a full scheme of mitigation would be agreed with the council archaeologist within a Written Scheme of Investigation (WSI).



Consultation Details	Consultee Comments	Applicant Response
Stirling Council Archaeologist (Scoping Response 15 August 2024)	The Stirling Council Archaeology Service agrees with the scope, methodology, mitigation measures, locations and types of visualisations proposed, with further additions. They note a low potential for unknown prehistoric and early 19th-century farming remains within the development area. They note that the presence of Scheduled Monuments nearby raises concern over visual impacts. Stirling Council recommends that baseline studies recommended are carried out in line with PAN 02/2011. These should include a desk-based assessment, a walkover survey, and a visual impact assessment (in line with Historic Environment Scotland guidance on setting). Scope should include both designated and undesignated heritage assets, aligned with Scotland's Historic Environment Audit ("SHEA") definitions. The council request that the Method Statement is to be agreed with the Archaeology	Noted with thanks. Archaeological potential for unknown remains from these periods is outlined in Section 11.4. The potential for impacts on the setting of all of the Scheduled Monuments within 10km of the Proposed Development have been assessed in Technical Appendix 11.2 and Section 11.7. Furthermore, impacts on Sir John de Graham's Castle (SM4278) have been considered throughout the design process. The asset has been excluded from the Site boundary and T1 has been moved further north east in order to limit impacts. PAN 02/2011 has been withdrawn since the publication of the scoping opinion, however, until its withdrawal surveys had been completed in line with its recommendations. All up-to-date and relevant policy and guidance (See Technical Appendix 4.1) has been followed throughout the EIA process and the production of this chapter. The archaeological baseline of the Site is described in Section 11.4. The results of the walkover survey is described in Section 11.4. The potential for impacts on the setting of Scheduled Monuments has been assessed in Technical Appendix 11.2 and Section 11.7. All surveys and desk-based assessments requested by the council have been carried out. These have been outlined throughout this chapter and



Consultation Details	Consultee Comments	Applicant Response
	Service to ensure adequacy of baseline data. Mitigation measures should include micro-siting, marking/fencing of assets, archaeological monitoring (e.g. watching brief, excavation), and a protocol for unexpected finds. The council provides additional recommendations for test-pitting and specialist assessment of potential lithic material.	form the basis for the conclusions presented. A proposed mitigation methodology has been provided in Section 11.9. A full methodology would be agreed with the council archaeologist and outlined within a WSI.
Carron Valley Community Council		
Carron Valley Community Council (Scoping Response 05 November 2024)	Carron Valley Community Council notes their concern over potential adverse impacts of turbine siting at Cairnoch Hill on the heritage environment of Sir John de Graham's Castle and Kirk o' Muir graveyard sites (the latter not referenced in the Scoping document).	Sir John de Graham's Castle (SM4278) has been scoped in for further assessment on potential impact to its setting and is discussed in Section 11.7. Furthermore, impacts on Sir John de Graham's Castle (SM4278) have been considered throughout the design process. The asset has been excluded from the Site boundary and T1 has been moved further north east (750m) in order to limit impacts, totalling a distance of 1.1km northeast from the asset. Kirk o' Muir Graveyard (SLR55) is discussed in Section 11.4. The asset will not be subject to direct physical impacts resulting from any construction activity associated with the Proposed Development. The asset's setting is localised and is therefore not anticipated to be impacted by visibility of the Proposed Development. As no impacts are anticipated, the asset was not discussed within the Scoping Report.
Historic Environment Scotland		
Historic Environment Scotland (HES) (Pre-Application Advice Response 18 September 2024)	<u>Potential setting impacts</u> HES noted that the following assets have been scoped in for detailed assessments: - Sir John de Graham's Castle (SM4278) - Waterhead, two standing stones 800m ENE of (SM2719)	A full settings assessment for each asset is provided in Section 11.7 of this chapter.



Consultation Details	Consultee Comments	Applicant Response
	- Todholes Cairn, 1000m NNE of (SM2492) - Todholes Cairn, 1300m NNW of (SM4491) They also requested that Dundaff Hill, mound 550m NE of summit (SM6553) is also included for assessment. HES state that Cairnoch Hill, the hill on which the Proposed Development is located, is a focus for views from two medieval castles and a number of prehistoric monuments. They argue that the hill therefore forms part of the setting and cultural significance of the monuments. Where monuments are likely to have intervisibility with one another, this could also be adversely impacted by the Proposed Development. Sir John de Graham's Castle (SM4278) is directly adjacent to the western boundary of the Proposed Development, and HES note that all four turbines would be visible from the asset and backdrop the castle in views towards the castle along the Carron Valley and Endrick Water. They request that visualisations should look towards Sir John de Graham's Castle from south west along the approach from Falkirk and also from Fintry Castle, Remains Of (SM7085), located to the west along the Endrick Water valley. For the monuments, Waterhead, two standing stones 800m ENE of (SM2719), Todholes Cairn, 1300m NNW of (SM4491), Todholes Cairn, 1000m NNE of (SM2492) and Dundaff Hill, mound 550m NE of summit (SM6553), we note that sightlines are important for the understanding of their position in the landscape with respect to Cairnoch Hill. HES recommend that viewpoints looking out from the monuments towards Cairnoch Hill are provided, and where there may	Noted. A full settings assessment for each asset is provided in Section 11.7 of this Chapter. Visualisations with respect to SM4278 are provided in Figures 11.4, 11.5, and 11.8. Visualisations with respect to these assets are provided in Figures 11.6, 11.7 and 11.9 11.10.



Consultation Details	Consultee Comments	Applicant Response
	be intervisibility and sightlines between the monuments, it would be helpful to understand where the turbines might appear between these views, and where they might backdrop the monuments in these views. HES note that there are no predicted impacts on Category A Listed Buildings or Inventory Gardens and Designed Landscapes due to a lack of visibility. If there were to be any impacts on assets of this type, then HES would request that they be assessed in full.	Noted. There are no predicted impacts on assets of these types.
Historic Environment Scotland (Scoping Response 30 September 2024)	HES notes that in its current form the proposed development has the potential for significant adverse impacts on a number of assets in their remit, the severity of which suggests they would be likely to object. Their position on the severity of these impacts would need to be informed by an adequate assessment within the EIA report, with supporting visualisations. This assessment would also need to include cumulative impacts. Methodology HES notes that the methodology of the Scoping Report contained conflicting criteria and terminology in Table 10-4: Significance of Impact and Table 10-5: Cultural Heritage Impact Matrix, and contained references to the Highland Council in section 10.8, rather than Stirling Council. Potential cumulative impacts HES notes the inclusion of assessment on potential cumulative impacts of the Proposed Development in combination with other developments in the vicinity should be included in the final EIA report.	The potential impact on the assets identified by HES as being of concern regarding impacts on setting is addressed in Section 11.7. Cumulative assessment is outlined within Section 11.8. Due to an administrative error references were made to the Highland Council rather than Stirling Council in the Scoping Report. An updated methodology, which is in line with the most recent guidance on wind farms (Scottish Renewables, 2025), has been provided within this chapter (Section 11.3). Cumulative impacts from operational developments have been assessed within Section 11.7. Cumulative impacts deriving from developments currently within the planning system are discussed in Section 11.8.



Consultation Details	Consultee Comments	Applicant Response
	HES reiterate their pre-application request for the full assessments of: • Sir John de Graham's Castle (SM4278) • Waterhead, two standing stones 800m ENE of (SM2719) • Todholes Cairn, 1000m NNE of (SM2492) • Todholes Cairn, 1300m NNW of (SM4491) • Dundaff Hill, mound 550m NE of summit (SM6553) They also reiterate their assessment of the importance of views towards Cairnoch Hill from these assets. HES note that there are no predicted impacts on Category A Listed Buildings or Inventory Gardens and Designed Landscapes due to a lack of visibility. If there were to be any impacts on assets of this type, then HES would request that they be assessed in full. HES reiterate their pre-application advice request for visualisations.	Noted. SLR Consulting Limited responded to HES in a letter dated 10 February 2025, requesting a joint Site visit to the assets scoped in for full assessment. The Site visit went ahead on 01 of April 2025. HES, where relevant, provided their thoughts on the Site layout during the visit and any comments were taken forward into the design iteration process. Noted. There are no predicted impacts on assets of these types. SLR Consulting Limited responded to HES in a letter dated 10 February 2025. The letter clarified the visualisation locations as the following: • Sir John de Graham's Castle (SM4278) – 268127, 685850; • View towards SM4278 from approach along the B818 – 266420, 686319; • Todholes Cairn, 1000m NNE of (SM2492) – 267748, 687021; • Todholes Cairn, 1300m NNW of (SM4491) – 267464, 687372; • Fintry Castle, remains of (SM7085) - 264168, 686390; • Dundaff Hill, mound 550m NE of summit (SM6553) - 273855, 684926; and • Waterhead, two standing stones 800m ENE of



Consultation Details	Consultee Comments	Applicant Response
		(SM2719) - 265707, 683932. Photomontages have been provided from the following assets: • Sir John de Graham's Castle (SM4278) – 268127, 685850; • View towards SM4278 from approach along the B818 – 266420, 686319; • Todholes Cairn, 1000m NNE of (SM2492) – 267748, 687021; and • Todholes Cairn, 1300m NNW of (SM4491) – 267464, 687372.
Historic Environment Scotland (Various communications regarding joint Site visit. February 2025)	SLR Consulting Limited requested that HES accompany them on Site visit to the assets scoped in for full assessment. It was agreed that the Site visit would be carried out on the 1st of April 2025.	The Site visit was carried out on 01 April 2025. The following assets were visited: • Sir John de Graham's Castle (SM4278) • Todholes Cairn, 1000m NNE of (SM2492) • Todholes Cairn, 1300m NNW of (SM4491) The following assets were not accessible: • Waterhead, two standing stones 800m ENE of (SM2719) • Dundaff Hill, mound 550m NE of summit (SM6553) No follow up comments were sought from the Applicant by HES after the Site visit, nor have HES made any further comments.



11.3 Assessment Methodology and Significance Criteria

- 11.3.1 Since the submission of the Scoping Report in September 2024, the Scottish Government have withdrawn a wide range of Planning Advice Notes. In addition, guidance was released regarding what is required to be presented in EIA reports for onshore wind farms in September 2025 (Scottish Renewables, 2025). As such, the methodology presented within Section 11.3 of this report reflects those changes to guidance.

Study Area

- 11.3.2 There is no guidance defining what the extent of an appropriate 'study area' should be for the cultural heritage assessment of wind farms. Any given study area will therefore represent an exercise in professional judgement with the use of an appropriately scaled Zone of Theoretical Visibility (ZTV) in relation to setting effects, refined to point of agreement between stakeholders during consultation.
- 11.3.3 Assets recorded within the Site and 1km of the Site boundary will be analysed to inform the archaeological potential of the Site (Shown in **Figure 11.1**).
- 11.3.4 With regards to the potential impacts on the setting of heritage assets, a ZTV calculation (Shown in **Figure 11.2**) has been used to identify which assets should be scoped in for further assessment. After analysis of the ZTV, a study area of 10km has been identified as the area where significant impacts to setting of affected assets are most likely, with visibility of the Proposed Development significantly reducing outside of this study area. As outlined in the EIA Handbook, visibility does not equate to adverse impact and the ZTV is to be used as a point of reference (Scottish Natural Heritage and HES, 2018, Appendix A, Paragraph 44).
- 11.3.5 Assets within this study area have been subject to an initial appraisal, set out in **Technical Appendix 11.2**, to determine the scope of the assessment. The study area is taken from the wind turbines, as the most visible and potentially impactful elements of the Proposed Development.
- 11.3.6 The above study area was applied with a degree of flexibility and assets outside of this study area where long-distance visibility contributes to their cultural significance have been considered. Where significant effects are likely, these have been scoped in to the assessment.

Data Sources

- 11.3.7 **Table 11-2** sets out the main data sources used in this Chapter.

Table 11-2: Main Data Sources Used in the Production of Chapter 11.

Subject	Source	Location
Designated heritage assets, comprising Scheduled Monuments, Listed Buildings, Inventory Gardens and Designed Landscapes, and Inventory Battlefields.	HES	HES digital data download
Conservation Areas	Stirling Council	HES digital data download
Non-designated heritage assets	HES Database – Trove	Digital data supplied as download



Subject	Source	Location
Non-designated heritage assets	Historic Environment Record (HER) data held by Stirling Council	Digital data supplied as download
Historic Ordnance Survey maps	National Library of Scotland	Online
Aerial photography	HES	HES database Trove and National Collection of Aerial Photograph (NCAP) (online)
LiDAR Data	Publicly available LiDAR data collated online.	Scottish Remote Sensing Portal – Online
Historic Land-Use Assessment (HLA)	HES	Online
Grey Literature	Unpublished reports	Various – Archaeological Data Service Archives, Council Archives
	Published reports and articles	Various – Academic Journals
Condition of recorded heritage assets within Site	Field inspection	Inspected by SLR Consulting on 20 August 2025
Setting of heritage assets	Field inspection within study areas and other specified assets from areas of public access.	Inspected by SLR Consulting on 18 September 2025

Field Surveys

- 11.3.8 The walkover survey was undertaken on 20 August 2025. The weather was dry and visibility outwith the forestry was good. The Site is used as a commercial forestry plantation, with all proposed wind turbines and infrastructure being located within the trees. Whilst all proposed wind turbine and infrastructure locations were visited, due to the densely planted forestry, visibility was limited at times. The assets observed and identified during the Site visit are outlined in Section 11.4 of this chapter.
- 11.3.9 The settings assessment Site visit was undertaken on 18 September 2025. The weather was dry and clear, with good visibility. The following assets scoped in for detailed assessment were visited:
- Sir John de Graham's Castle (**SM4278**);
 - Todholes, cairn 1000m NNE of (**SM2492**); and
 - Todholes, cairn 1300m NNW of (**SM4491**).
- 11.3.10 Due to access constraints for Waterhead, two standing stones 800m ENE of (**SM2719**) and Dundaff Hill, mound 550m NE of summit (**SM6553**), these assets were not visited.

Zone of Theoretical Visibility

- 11.3.11 The assessment of impacts on an asset's setting has been assisted by a ZTV calculation, presented on **Figure 11.2**. A ZTV calculation maps the predicted degree of visibility of a proposed development from all points within a proportionate, defined study area, as would be seen from an average observer's eye level (two metres above ground level). The ZTV model presented on **Figure 11.2** is based



upon the maximum level of theoretical visibility, i.e. the maximum height of the wind turbine blade tips. As bare-earth topographical data was used, the ZTV assumes the worst-case scenario, with no screening such as vegetation or buildings. For further information on the ZTV methodology, refer to **Chapter 7: Landscape and Visual**.

Assessment of Potential Effect Level and Significance

- 11.3.12 The Proposed Development has the potential to result in effects upon the cultural significance of heritage assets where it changes their baseline condition and/or their setting.
- 11.3.13 In accordance with the EIA Regulations and the EIA Handbook, this assessment has identified any development impacts as direct (physical) impacts, indirect (physical) impacts, direct (settings) impacts, and cumulative impacts (the EIA Handbook Appendix 1, Paragraph 44). With regard to the EIA handbook, consideration has also been given to whether the impacts are adverse or beneficial, and short-term, long-term, or permanent (the EIA Handbook Section C, Box C.7.Info.1).
- 11.3.14 Impacts on cultural heritage assets have been identified and assessed with reference to the guidance set out in the EIA Handbook (and the Historic Environment Policy for Scotland (HEPS), specifically HEP3 and HEP4 which set out:
- HEP3:** Plans, programmes, policies and strategies, and the allocation of resources, should be approached in a way that protects and promotes the historic environment. If detrimental impact on the historic environment is unavoidable, it should be minimised. Steps should be taken to demonstrate that alternatives have been explored, and mitigation measures should be put in place.
- HEP4:** Changes to specific assets and their context should be managed in a way that protects the historic environment. Opportunities for enhancement should be identified where appropriate. If detrimental impact on the historic environment is unavoidable, it should be minimised. Steps should be taken to demonstrate that alternatives have been explored, and mitigation measures should be put in place.
- 11.3.15 Direct impacts upon the cultural significance of heritage assets have considered the level of their cultural significance (where known) and the magnitude (extent) of the identified impacts.
- 11.3.16 Where direct impacts on an asset's setting are concerned, the sensitivity of an asset's setting to change is also considered and will be carried out following the three-stage approach outlined in HES guidance, Managing Change in the Historic Environment: Setting (, 2020, Page 8). The three-step approach is as follows:
- Stage 1: identify the historic assets that might be affected by the Proposed Development;
 - Stage 2: define and analyse the setting by establishing how the surroundings contribute to the ways in which the historic asset or place is understood, appreciated and experienced; and
 - Stage 3: evaluate the potential impact of the proposed changes on the setting, and the extent to which any negative impacts can be mitigated.



Cultural Heritage Significance

- 11.3.17 Both designated and non-designated heritage assets are material considerations in the planning process as national planning policy promotes the care and protection of the historic environment as set out in in HES' Designation Policy and Selection Guidance.
- 11.3.18 Appendix 1 Figure 2 of the EIA Handbook sets out an Example of Scale of Sensitivity of Historic Environment Receptors. This is referred to as "*sensitivity*" (Scottish Natural Heritage and HES, 2018, Page 185) in the EIA Handbook and will henceforth be referred to as cultural heritage significance. **Table 11-3** expands on this and has been used as an aid to consistency in the exercise of professional judgement and provide transparency for others in evaluating the conclusions drawn.

Table 11-3: Cultural Heritage Significance

Cultural Heritage Significance	Criteria
Highest	Sites of international importance, including: • World Heritage sites.
High	Sites of National importance, including: • Scheduled Monuments; • Category A Listed Buildings; • Gardens and Designed Landscapes included on the national inventory; • Inventoried Battlefields • Conservation Areas containing nationally important buildings; and • Non-designated assets of equivalent significance as identified by the local heritage officer or professional judgement.
Medium	Sites of Regional/Local importance, including: • Category B and C Listed Buildings; • Conservation Areas containing buildings that contribute significantly to its character; and • Non-designated assets of equivalent significance.
Low	Assets of Local importance. Heritage assets that are compromised by poor preservation and/or poor survival of contextual associations or with little of the asset remaining to justify a higher importance.
Negligible	Assets that are of very little or no heritage interest. Heritage assets where the ability to interpret their archaeological context has been removed/eroded.
Unknown	Further information is required to assess the significance of these assets.

- 11.3.19 The factors contributing to cultural significance extend beyond their designation status and are subject to more individual nuance based on the asset's type, function, and preservation. The assessment takes into account the factors contributing to an asset's cultural significance as well as the sensitivity of the heritage asset to change.
- 11.3.20 An asset's sensitivity of change refers to the capacity of the asset's setting to retain its ability to contribute to the understanding, appreciation, and experience of the



asset and its cultural significance despite the introduction of changes caused by the Proposed Development to the asset's baseline environment.

- 11.3.21 The contribution of the asset's setting to its cultural significance, and sensitivity thereof, varies based on the type of asset, its preservation, and its current setting. As part of the assessment, the contribution of the asset's setting and relative sensitivity to change will be presented with relevant justification, utilising the results of desk-based research, a field visit, and professional judgement.
- 11.3.22 Due to the unique qualities of each heritage asset, this will be determined on a case-by-case basis for each receptor in line with HES's Managing Change in the Historic Environment: Setting) guidance and the EIA Handbook in accordance with the above methodology (**Table 11-3**).

Magnitude of Change

- 11.3.23 Determining the magnitude of any likely changes includes consideration of the nature of the activities proposed during the construction, operational and decommissioning phases of the Proposed Development. Changes could potentially include, but are not limited to, ground disturbance due to construction activities and changes to setting. The latter might include visual change, as well as the introduction of noise, vibration, smell, dust, or traffic movements.
- 11.3.24 Considering all embedded mitigation measures (Section 11.5), the magnitude of any change has been assessed using professional judgement, with reference to the criteria set out in **Table 11-4**.
- 11.3.25 Where adverse impacts on cultural heritage assets are possible, the magnitude of change can be reduced through measures to prevent, reduce and/or, where possible, offset these effects.

Table 11-4: Magnitude of Change

Magnitude of Change	Explanatory Criteria
High Beneficial	Changes to the elements of the fabric or the setting of the cultural heritage asset that contribute to its cultural significance, such that this cultural significance, or the ability to understand, appreciate and experience the asset, is considerably enhanced.
Medium Beneficial	Changes to the elements of the fabric or the setting of the cultural heritage asset that contribute to its cultural significance, such that this cultural significance, or the ability to understand, appreciate and experience the asset, is enhanced to a clearly discernible extent.
Low Beneficial	Changes to the elements of the fabric or the setting of the cultural heritage asset that contribute to its cultural significance, such that this cultural significance, or the ability to understand, appreciate and experience the asset, is enhanced to a minor extent.
Neutral/None	The Proposed Development would not impact the cultural heritage significance of the heritage asset, or the ability to understand, appreciate and experience it.
Low Adverse	Changes to the elements of the fabric or the setting of the cultural heritage asset that contribute to its cultural significance, such that this cultural significance, or the ability to understand, appreciate and experience the asset, is eroded to a minor extent.
Medium Adverse	Changes to the elements of the fabric or the setting of the cultural heritage asset that contribute to its cultural significance, such that this cultural



Magnitude of Change	Explanatory Criteria
	significance, or the ability to understand, appreciate and experience the asset, is eroded to a clearly discernible extent.
High Adverse	Changes to the elements of the fabric or the setting of the cultural heritage asset that contribute to its cultural significance, such that this cultural significance, or the ability to understand, appreciate and experience the asset, would be considerably eroded.

Significance of Effect

11.3.26 **Table 11-5** provides a matrix that relates the cultural significance of the asset to the magnitude of change on its cultural significance, to produce an overall anticipated level of effect (significance of effect).

Table 11-5: Significance of Effect Matrix

		Cultural Significance (Excluding Unknown)				
		Highest	High	Medium	Low	Negligible
Magnitude of Change	High Beneficial	Major	Major	Moderate	Minor	Minor
	Medium Beneficial	Major	Moderate	Minor	Minor	Negligible
	Low Beneficial	Moderate	Minor	Minor	Minor	Negligible
	Neutral/None	Neutral/Nil	Neutral/Nil	Neutral/Nil	Neutral/Nil	Neutral/Nil
	Low Adverse	Moderate	Minor	Minor	Minor	Negligible
	Medium Adverse	Major	Moderate	Minor	Minor	Negligible
	High Adverse	Major	Major	Moderate	Minor	Minor

Cumulative Effect

11.3.27 Cumulative effects have been assessed in line with the guidance provided at Page 182 and 183 of the EIA Handbook. A cumulative effect may occur when there is a combination of:

- An impact on an asset or group of assets due to changes resulting from the Proposed Development; and
- An impact on the same asset or group of assets resulting from other wind farm developments (pending decision, consented, or under construction, but not operational) within the surrounding landscape.

11.3.28 In line with guidance presented in HES' Managing Change in the Historic Environment: Setting (Page 9), any effect resulting from operational wind farms has been considered as part of the baseline of the asset and will be considered in the construction and operational impacts sections of this chapter.

11.3.29 Assets with a minor or higher significance of effect resulting from the Proposed Development in isolation have been considered for cumulative assessment, as these assets are most likely to be susceptible to significant cumulative effects. A study area of 15km from each asset assessed has been chosen based on professional judgement, allowing the assessment to encompass both the Proposed



Development and any other developments within the surrounding landscape deemed to have the potential for cumulative effects.

- 11.3.30 The developments included for cumulative assessment are accurate as of April 2026 and are found in **Table 11-10**.

Significance

- 11.3.31 Once the anticipated effects of the Proposed Development upon cultural heritage assets are defined, professional judgement is used to determine whether those effects would be either 'significant' or 'not significant' for the purposes of EIA. As part of this determination process, regard was given to any relevant guidance.
- 11.3.32 With reference to the matrix presented in **Table 11-5**:
- Any effects identified as 'major' would most probably be considered 'significant';
 - Any effects identified as 'moderate' might also be considered 'significant,' although professional judgement may determine otherwise on the basis of the associated Site-/asset-specific detail; and
 - Any effects identified as 'minor' or less are unlikely to be considered 'significant,' though again, professional judgement has been exercised.
- 11.3.33 A clear statement has been made in relation to all affected assets as to whether the identified effects upon them are considered to be 'significant' or 'not significant' for purposes of EIA.

Application of NPF4

- 11.3.34 The following are excerpts from Policy 7: Historic Places in NPF4:

Policy 7a) Development proposals with a potentially significant impact on historic assets or places will be accompanied by an assessment which is based on an understanding of the cultural significance of the historic asset and/or place. The assessment should identify the likely visual or physical impact of any proposals for change, including cumulative effects and provide a sound basis for managing the impacts of change. Proposals should also be informed by national policy and guidance on managing change in the historic environment, and information held within Historic Environment Records.

Policy 7h) states that development proposals affecting scheduled monuments will only be supported where; i. direct impacts on the scheduled monument are avoided; ii. significant adverse impacts on the integrity of the setting of a scheduled monument are avoided; or exceptional circumstances have been demonstrated to justify the impact on a scheduled monument and its setting and impacts on the monument or its setting have been minimised¹.

Policy 7o) Non-designated historic environment assets, places and their setting should be protected and preserved in situ wherever feasible. Where there is potential for non-designated buried archaeological remains to exist below a site, developers will provide an evaluation of the archaeological resource at an early stage so that planning authorities can assess impacts. Historic buildings may also

¹ A significant effect in EIA terms does not necessarily equate to a significant adverse impact on the integrity of setting of a scheduled monument.



have archaeological significance which is not understood and may require assessment.

Mitigation

- 11.3.35 A statement of any embedded mitigation measures proposed to be implemented in response to identified cultural heritage impacts is provided (Section 11.5), with the impact predictions taking these into account. The main approach to mitigating both direct and indirect impacts has been through design. Avoidance of direct impacts on heritage assets has been a consideration throughout the design process.
- 11.3.36 Suitable measures for minimising effects through ground disturbance 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.
- 11.3.37 Suitable measures for mitigating any setting effects might include:
- Alteration of the proposed wind turbine layout; and/or
 - Reduction of proposed wind turbine heights.
- 11.3.38 Where avoidance has not been possible, further mitigation has been proposed as a condition to consent (Section 11.9).

Assessment of Residual Effect Level and Significance

- 11.3.39 Residual effects are the resulting effects after consideration of proposed mitigation measures. A statement of the residual effects of the Proposed Development has been provided (Section 11.10), taking into account any Site-specific mitigation measures which could be implemented as a condition to consent.

Assumptions and Limitations

- 11.3.40 The assessment is based on the sources outlined in both **Table 11-2** and the References section of this chapter, and therefore, shares the same range of limitations in terms of comprehensiveness and completeness of those sources.

11.4 Baseline Conditions

Introduction

- 11.4.1 A full description of the Site and environs is given in **Chapter 2: Design Evolution and Alternatives**. All heritage assets within the 1km study area are shown on **Figure 11.1**. Designated assets within the 10km study area are shown in relation to the ZTV on **Figure 11.2**.
- 11.4.2 All recorded designated and non-designated heritage assets within 1km of the Site Boundary are listed in the gazetteer that is contained within **Technical Appendix 11.1**. Where designated assets are tabulated in this chapter, they are identified by



the index number (i.e. scheduled monuments) or reference number (i.e. listed buildings) under which they are registered by HES.

Designated Heritage Assets

- 11.4.3 Within 10km of the proposed wind turbine locations, there are 209 Designated Heritage Assets. These assets comprise one World Heritage Site, 58 Scheduled Monuments, 137 Listed Buildings, three Inventoried Gardens and Designed Landscapes, three Inventoried Battlefields, and seven Conservation Areas. Of the listed buildings, there are 13 designated as category A, 85 as category B, and 39 as category C.
- 11.4.4 The World Heritage Site is the Antonine Wall, which forms part of the Frontiers of the Roman Empire World Heritage Site.
- 11.4.5 There are no designated heritage assets within the Site boundary.

Topography and Geology

- 11.4.6 The Site is situated on Cairnoch Hill, which reaches a height of 413m AOD. Carron Valley Reservoir is situated to the south of the Site, with Endrick Water located approximately 0.6km west of the Site boundary and Earl's Burn located directly north east of the Site boundary.
- 11.4.7 The soil composition of the Site comprises brown earths in the south west, noncalcareous gleys with humic gleys throughout the centre of the Site, and peaty gleyed podzols with peaty gleys with dystrophic blanket peat towards the north of the Site.
- 11.4.8 There are a variety of bedrock geologies throughout the Site, comprising Waterhead Central Volcanic-complex, Gargunnock Hills Lava Member and Campsie Lava Member. Superficial deposits across the site include Devensian till, Hummocky Glacial Deposits, and peat.
- 11.4.9 In accordance with the Association of Local Government Archaeological Officers' (ALGAO) Guidance for Peatland Restoration and the Historic Environment in Scotland (Mann, 2022), peat is classed as a cultural heritage resource due to its unique ability to preserve organic and inorganic archaeological remains. Formed after the ice-age, the peatlands provide a waterlogged and anaerobic environment which leads to a much slower rate of decay for archaeological and palaeoenvironmental remains compared to other soil types (Geary, et al., 2010).
- 11.4.10 Whilst there is limited presence of peat across Site, as detailed in **Chapter 10: Hydrology, Hydrogeology, Geology and Soils**, there is a potential for environmental or organic deposits to survive.

Archaeological Baseline

Prehistoric Context

- 11.4.11 There are no recorded prehistoric heritage assets within the Site boundary; however, there are 23 prehistoric heritage assets recorded within 1km of the Site boundary.
- 11.4.12 One of these assets, a Bronze Age burial cairn (**SLR54**) is a Scheduled Monument (**SM2492**). The asset is located approximately 1.5km north west of T1, at the base of the eastern extent of the Fintry Hills and overlooking Endrick Water to the east.



- 11.4.13 The remains of a roundhouse (**SLR34**) are recorded approximately 0.4km south of the cairn, along the western bank of Endrick Water. The roundhouse is located approximately 1.5km west of T1.
- 11.4.14 There are the remains of three hut circles recorded along the western flood plain of Endrick Water. **SLR16** is the most northerly, located approximately 1.5km north west of T1, **SLR14** is located 1.6km north west of T1, and **SLR15** is the most southerly, located approximately 1.7km south west of T1.
- 11.4.15 A Bronze Age burnt mound (**SLR80**) is recorded approximately 0.9km north west of T4. The burnt mound is located approximately 0.5km south of Earl's Burn, with burnt mounds often found associated with watercourses. A hut circle (**SLR32**) is located approximately 0.8km north west of the burnt mound, on the northern bank of Earl's Burn. The hut circle is 1.67km north east of T4.
- 11.4.16 A quartz quarry (**SLR33**), potentially prehistoric in date, is located approximately 1.2km north of T1, identified during a watching brief for Earls Burn Wind Farm.
- 11.4.17 A large concentration of 15 hut circles² was identified on a south east-facing slope, to the west of Earl's Burn. The closest hut circle to the Proposed Development is **SLR25**, which is located approximately 1.7km north east of T2.

Romano-British Context

- 11.4.18 There are no Roman assets recorded within the Site boundary or within 1km of the Site boundary.
- 11.4.19 The Antonine Wall, which forms part of the Frontiers of the Roman Empire UNESCO World Heritage Site, runs approximately 7.4km to the south of the Site boundary. The Wall, which served as the northernmost frontier barrier of the Roman Empire, is surrounded by a concentration of assets dated to the Romano-British period. However, there is no evidence of there being Roman activity within the area of Carron Valley that would be occupied by the Proposed Development.

Medieval Context

- 11.4.20 There are no medieval heritage assets recorded within the Site; however, there are five definitive medieval assets recorded within 1km of the Site Boundary.
- 11.4.21 A small burial ground (**SLR55**, **SLR57**), named Kirk o' Muir burial ground, is recorded to the immediate south east of the Site boundary, approximately 80m east of the Site entrance from the B818 and 1.5km south west of T4. The earliest identifiable gravestone within the graveyard has a date of 1695; however, it is believed that a chapel dedicated to St Mary (**SLR56**) was founded on the Site in the middle of the 15th century, remaining in use and standing for approximately 200 years. The chapel is no longer extant.
- 11.4.22 The location of a potential church (**SLR59**) is recorded approximately 1.4km south east of T4. The record is derived from the surrounding place names of Craigannet Hill, Craigannet Craig, and Easter Craigannet. These names included the element 'annait,' which was a 9th and 10th-century term for an abandoned church site.
- 11.4.23 The site of Sir John de Graham's Castle (**SM4728**; **SLR13**) is recorded 70m west of the Site boundary and approximately 1.1km south west of T1. The asset comprises a square moated enclosure, accessed from the north east. There are manmade ponds to the west and south, with rig and furrow visible to the south east.

² SLR17, SLR18, SLR19, SLR20, SLR21, SLR22, SLR23, SLR24, SLR25, SLR26, SLR27, SLR28, SLR29, SLR30, SLR31



- Historically, the motte is associated with Sir John de Graham of Dundaff. Graham was a 13th-century noble, believed to have fought alongside William Wallace at Stirling Bridge and the Battle of Falkirk. Graham died at the Battle of Falkirk in 1298, so we can presume the motte was constructed before this date.
- 11.4.24 In addition, there are 13 assets recorded dated as medieval to post-medieval within 1km of the Site boundary.
- 11.4.25 A cluster of five assets was recorded in close proximity to each other to the north east of the Site boundary, approximately 1.3km to the north east of T4. The assets comprise the remains of a corn drying kiln (**SLR62**), the remains of a settlement (**SLR63**), likely pre-improvement in date, the remains of a building (**SLR64**), the remains of a building platform (**SLR73**) and the remains of a field bank (**SLR74**). These assets are all likely related to medieval and post-medieval agricultural and pastoral activity, located on a gentle south-facing slope on the northern bank of Earl's Burn, likely within fertile soil.
- 11.4.26 To the north west of this cluster of assets, there are three further medieval to post-medieval records. **SLR65** comprises a sheep ree, located approximately 1.5km north east of T4. **SLR72** comprises an area of rig cultivation, located on a south east-facing slope on the western bank of Earl's Burn, approximately 1.5km north of T4. **SLR78** comprises a shieling, located closer to the summit of Craigengelt Hill, approximately 1.7km north east of T4.
- 11.4.27 A grouping of four medieval to post-medieval dated assets is located along the banks of Endrick Water, approximately 1.5km north west of T1. These assets comprise a farmstead named Cringate (**SLR69**), which was occupied until 1980, a field system (**SLR70**), an area of rig cultivation (**SLR75**), and a dyke (**SLR76**). A further medieval to post-medieval asset, an area of clearance cairns/field clearance (**SLR77**) is recorded on the eastern bank of Endrick Water, approximately 0.8km south of the Cringate farmstead grouping and 1.5km west of T1.

Post-medieval Context

- 11.4.28 There are nine assets that likely date to the post-medieval period within the Site boundary, all located within the south of the Site.
- 11.4.29 **SLR68** is recorded as a farmstead, comprising one unroofed building with an attached wall and one enclosure. The asset was identified on the 1st Edition Ordnance Survey (OS) mapping, dated to 1864 (Stirlingshire, Sheet xxii), with the asset visible as an area of differential crop growth on modern satellite imagery. The asset is located approximately 0.2km south of the southern area of tracks, and approximately 1.2km south west of T2.
- 11.4.30 **SLR60** and **SLR61** comprise a farmstead and an enclosure, named Boon a' Kirk on historic mapping. The farmstead is depicted on the 1864 OS mapping as comprising an L-shaped roof building, with an attached rectangular unroofed structure. The assets are still present, as ruinous buildings, and were identified during the 2025 walkover survey. They are located directly to the north of the access track, approximately 1.4km south west of T4.
- 11.4.31 A sheep ree (**SLR101**) is recorded 0.9km south west of T3, having been identified through the Six-inch 1st edition Ordnance Survey map, Stirlingshire, Sheet XXII, published 1864. The asset was visited during the 2025 walkover and was noted as a ruinous rectangular sheepfold, with wall footings approximately 1m in height. A historic field boundary (**SLR108**) was recorded as running to the north of **SLR101**. The wall is ruinous in nature and is approximately 0.5m in height. Due to their inclusion on the 1st edition Ordnance Survey map, these assets are likely post-medieval in date.



- 11.4.32 To the north of **SLR108**, a series of four connected sheepfolds (**SLR102**) was identified through the Six-inch 2nd edition Ordnance Survey map, Stirlingshire Sheet XXII.SE, published 1899. The sheepfolds were visited during the 2025 walkover survey, where they were recorded as ruinous in nature, with intermittent sections of wall approximately 1m in height. Due to their inclusion on the 2nd edition Ordnance Survey map, these assets are likely post-medieval in date.
- 11.4.33 Three further sheepfolds (**SLR103**, **SLR104**, **SLR105**) are noted on the Six-inch later edition Ordnance Survey Map, Stirlingshire Sheet nXXII, published 1922. These sheepfolds are located 1.1km, 0.42km, and 0.68km south west of T4, respectively. The locations of **SLR103**, **SLR104**, and **SLR105** were attempted to be visited during the 2025 walkover survey; however, their presence could not be confirmed due to the thick commercial forestry causing access restrictions. Due to their inclusion on the 1922 edition Ordnance Survey map, these assets are likely post-medieval in date, having been constructed prior to 1922.
- 11.4.34 In addition to the post-medieval assets within the Site, there are a further 16 post-medieval heritage assets recorded within 1km of the Site boundary.
- 11.4.35 A 'water meadow' (**SLR12**) is recorded to the south of the Site boundary, approximately 1.8km south west of T1. The 'water meadow' comprises an area of hay meadow, once described as the largest hay meadow in Scotland, which has been flooded and destroyed due to the construction of the Carron Valley reservoir in 1939.
- 11.4.36 A building or sheepfold (**SLR79**), identified through aerial photo during a 2010 survey, is recorded to the east of the Site boundary, approximately 1.1km south east of T4.
- 11.4.37 There are six post-medieval assets, all agricultural in nature, recorded along the banks of Earl's Burn, to the north of the Site boundary. **SLR6**, noted as the remains of a longhouse, is located approximately 1.7km north east of T4. The turf-covered footings of a small building (**SLR3**) are located approximately 1.2km north of T4, with the remains of a track (**SLR10**) located approximately 0.2km to its south east. These assets are located to the north east to the cluster of medieval to post-medieval dated assets recorded on the northern banks of Earl's Water, and are potentially related to the settlement and farmstead.
- 11.4.38 A group of three associated assets are located approximately 1.5km north east of T3. They all comprise assets associated with a farmstead, with **SLR4** being the record of two now demolished structures, **SLR5** being the remains of a large enclosure, and **SLR9** being the remains of a track leading to the enclosure.
- 11.4.39 A sheepfold (**SLR7**) is located approximately 1.4km north east of T2, which was noted as disused on the modern OS maps.
- 11.4.40 A sheep shelter (**SLR8**) is recorded approximately 1.5km north west of T1.
- 11.4.41 A disused aqueduct (**SLR1**) is recorded 0.5km west of the Site boundary and 1.3km west of T1. The aqueduct used to feed Loch Walton, which is located approximately 1km to its west, with water from Endrick Water. **SLR2** records the location of a bridge, which crosses the aqueduct, approximately 1.6km south west of T1.
- 11.4.42 An area of lazy beds (**SLR71**) is recorded approximately 1.5km west of T1, along the western bank of Endrick Water. Lazy beds are a hand-dug cultivation practice associated with the production of potatoes.
- 11.4.43 **SLR66** records the location of a farmstead, shown on the 1st edition OS map to be named Knowehead and to have been ruinous by the time of the map's production in 1864. The farmstead comprises one long building and an enclosure. **SLR67**



appears to record the location of a set of enclosures, directly to the north of the larger long building, which are likely associated with the farmstead. The farmstead is located along the northern bank of Carron Valley Reservoir, which was not constructed at the time of the farmstead's operation, and is located directly south of the path of Endrick Water. The farmstead is located approximately 1.7km south west of T1.

- 11.4.44 **SLR11** records the position of Randieford Bridge, which carries the modern B818 road over Endrick Water, approximately 1.7km south west of T1.

Modern Context

- 11.4.45 There are no recorded heritage assets within the Site itself, with one heritage asset recorded within 1km of the Site boundary.
- 11.4.46 The landscape to the south of the Site changed dramatically in 1939, with the completion of the construction of the Carron Valley Reservoir (**SLR100**). The reservoir was created by damming the River Carron to its east and Endrick Water to its west. The reservoir is the fourth largest supply of domestic and industrial water in Scotland.

Undated Heritage Assets

- 11.4.47 There are two undated heritage assets within the Site boundary.
- 11.4.48 The remains of two stone walls were identified during the 2025 walkover survey (**SLR106**, **SLR107**). **SLR106** is located 60m west of T2 and runs to the south west. **SLR107** joins **SLR106** 70m north of its southern terminus. Both walls are ruinous and stand at a maximum height of 0.5m.
- 11.4.49 In addition, there are 20 recorded undated heritage assets within 1km of the Site boundary.
- 11.4.50 There are four undated heritage assets recorded along the northern bank of Earl's Burn, to the north east of the Site. A large stone (**SLR39**) recorded as potentially a boundary stone is noted approximately 1.7km north east of T4. The stone is marked at the same point as the post-medieval longhouse recorded as **SLR6**. **SLR38** marks the location of an enclosure, approximately 1.3km north east of T4. It is located amongst the cluster of medieval to post-medieval agricultural assets to the north east of the site boundary and likely shares a similar date.
- 11.4.51 **SLR52** records a structure, described as made of turf and stone and being a stony bank enclosing a slight grassy depression, measuring 2.5m in width. **SLR53** is adjacent to **SLR52** and is recorded as a cairn, formed of a low circular mound of stones. Both assets are located approximately 1.2km north east of T4.
- 11.4.52 **SLR58** depicts the location of a mound, recorded as a natural feature within the HER. Whilst earlier accounts state that the mound is man-made, it is most likely of glacial origin.
- 11.4.53 **SLR37** depicts the location of a quarry scoop, approximately 2km north east of T3. Two structures (**SLR40**, **SLR42**), poorly preserved, are located approximately 1.5km north of T2. These structures are adjacent to an area of quarrying (**SLR41**) that appears to have been used to build the dry-stone walls in the area.
- 11.4.54 A series of five areas of clearance cairns³ are located within agricultural land along the western banks of Endrick Water. Clearance cairns are created as part of the

³ SLR35, SLR36, SLR48, SLR49, SLR50



- removal of fieldstones from arable land to allow for agricultural practices. An undated cairn (**SLR45**) is located approximately 1.6km south west of T1. The cairn is recorded as standing 0.5m in height, and its function is not recorded. It is situated within the area of clearance cairns but is also within 100m of a prehistoric hut circle (**SLR34**).
- 11.4.55 A small rectangular structure (**SLR44**) is recorded along the western bank of Endrick Water, approximately 1.5km south west of T1. The structure was recorded during a survey in 2003, recording a 4m by 3m turf-banked structure with a possible footing running to the south. **SLR51** records the location of a further structure identified in 2003, with an unidentified function.
- 11.4.56 Two areas of the same wall (**SLR46, SLR47**) are recorded 1.5km south west of T1. The wall was identified in 2003 during a survey, with the asset recorded as being 1.5m wide and 0.3m high.

Historic Mapping, Historic Land Use Assessment, Aerial Photographs, and LiDAR

- 11.4.57 The data available from Historic Environment Scotland's Historic Land Use Assessment shows the Site as being a mixture of Commercial forestry and rough grazing, with no distinctive past land use.
- 11.4.58 The area of the Site is first visible on Pont's map of '*The East Central Lowlands (Stirling, Falkirk & Kilsyth)*', which is dated between 1583-1596. Sir John de Graham's Castle (**SM4278**) is visible as Dundaff Castell. A place noted as Santauries is recorded to the east of the castle, which may be the location of Kirk o' Muir chapel (**SLR56**); however, the symbology is not consistent with Pont's other depictions of chapels within his work. A further settlement is located to their north; however, this settlement is unnamed.
- 11.4.59 'Dundaf' is recorded on Gordon's 1636-1652 map of '*A map of Eastern Scotland, including basins of Rivers Don, Dee, Tay, Forth, and Tweed*'. There are no other settlements recorded nearby. 'Dun-daff Castell' is again recorded on Blaeu's 1654 map '*Sterlinensis praefectura, [vulgo], Sterlin-Shyr*', with the location of the unnamed settlement to the north marked and the settlement of Santauries to the east marked.
- 11.4.60 The site is not shown in detail on Moll's 1745 map of '*The Shires of Stirling and Clackmannan &c*'; however, Dundaff Castel is noted.
- 11.4.61 Roy's military map from 1747-55 shows multiple farmsteads that are potentially located within the Site boundary. From east to west, these are named Sheen Hill, Ashen Tree, Hole Craig, Aboon the Kirk, and Dyke House. Sheen Hill appears to be in a similar location to the buildings noted as SLR68, and Ashen Tree may be in a similar location to Cairnoch, a small farmstead located along the southern site boundary that is recorded on the 1st edition OS Map. Aboon the Kirk is almost certainly Boon a' Kirk farmstead (**SLR60, SLR61**); however, it's not obvious if Hole Craig and Dyke House are similar to any other known structures.
- 11.4.62 The Site is first seen in general on Thomson's map of Stirlingshire (1820), with the hill range within the site named as part of the Craigannet Hills. Boon a' Kirk farmstead (**SLR60, SLR61**) is recorded a Buna Kirk, with Kirk o' Muir (**SLR55, SLR56, SLR57**) recorded to its west. Sir John de Graham's Castle (**SM4278**) is recorded and stated to be in ruins. No further settlements are noted within the Site.
- 11.4.63 The Site is shown in detail on Ross's 1780 map titled '*A map of Stirling Shire from an actual survey*', however, no assets are noted within the Site.



- 11.4.64 The First Edition 6-inch OS map shows the site as being largely moorland, with field boundaries spreading throughout the site. Sir John de Graham's castle is shown to the west of the site, the aforementioned Cairnoch farmstead located to the south, and Boon a' Kirk farmstead is located within the site, with a track heading south. The site of Kirk o Muir graveyard is recorded to the south east, and is noted as having a school within the same yard. The land to the west of the graveyard is noted as Priest's croft.
- 11.4.65 The 1899 6-inch OS maps, which cover the Site, show little change, apart from a series of four small enclosures (**SLR102**), which appear to be agricultural in nature.
- 11.4.66 The 1922 6-inch OS map shows several sheepfolds not recorded on earlier maps (**SLR103, SLR104, SLR105**). Both **SLR104** and **SLR105** are recorded as 'old sheepfolds'.
- 11.4.67 A review of the available aerial and satellite photography shows that the site has been in use for commercial forestry since the 1980s. No additional heritage assets were identified within the site. In addition, the available LiDAR data for the Site was examined, with no further assets being identified.

Discussion of the Site

- 11.4.68 A large portion of the site is covered in commercial forestry, of which the roots and any methods of installation have the potential to disrupt archaeological stratigraphy from any period. As such, heritage assets within the forested areas are less likely to have survived to a noticeable extent under these conditions.
- 11.4.69 Whilst there is no evidence of prehistoric activity within the Site, there is evidence of prehistoric activity within the surrounding area. This activity appears to be mainly focused along the banks and floodplains of the Endrick Water and Earl's Burn. The majority of these assets are domestic in nature and indicate prehistoric settlement activity along the watercourses. A Bronze Age burial cairn (**SM2492**) is located to the north west of the Site, indicating that there was some degree of funerary activity taking place within the surrounding landscape. There is some potential for surviving prehistoric assets within the Site, particularly domestic assets along the southern bank of Earl's Burn in the north east of the Site. However, due to the extensive commercial forestry, the condition of these potential remains is likely to be poor.
- 11.4.70 There are no Romano-British assets recorded within the Site or within 1km of the Site boundary, and as such, there is negligible potential for archaeological remains of this date.
- 11.4.71 There are a number of medieval heritage assets recorded within 1km of the Site boundary. The large majority of the assets comprise those of an agricultural nature, relating to livestock or crop cultivation. Due to the site's agricultural land-use in subsequent periods, it is very likely that it was used for this reason during the medieval period. As such, there is a moderate potential for medieval agricultural remains within the Site, likely comprising land boundaries, enclosures, or other farming remains.
- 11.4.72 Sir John de Graham's Castle (**SM4278**) is located to the south west of the Site boundary. Whilst the scheduled area does not extend into the site, there is the potential that some outlying remains, likely agricultural in nature, may fall within the site boundary. Furthermore, Kirk o' Muir (**SLR55, SLR56, SLR57**) is located to the south east of the Site. Whilst historic mapping does not appear to show the asset extending into the Site boundary, there is the potential for some associated remains to lie within the very southern extent of the Site.



- 11.4.73 During the post-medieval period, the Site appears to have been used for agricultural purposes, as evidenced by the farmsteads and enclosures situated within the boundary. The general trend of post-medieval agriculture extends outwith the Site boundary, again demonstrated through the presence of farmsteads and associated infrastructure. Furthermore, there are several recorded undated agricultural assets, both within the site and outwith the Site boundary, most likely associated with the post-medieval agricultural practices. Whilst the commercial forestry is likely to have disturbed some post-medieval heritage assets, the 2025 Site walkover identified preserved, although ruinous, field boundaries and enclosures, within the areas not occupied by forestry. As such, there is a medium potential for surviving unrecorded post-medieval heritage assets within the areas of the site not impacted by commercial forestry.
- 11.4.74 There is a singular modern heritage asset recorded within 1km of the Site boundary, the infrastructure related to the Carron Valley Reservoir (**SLR100**). The site is well documented through historic mapping, and no further assets from this time period have been identified. As such, there is negligible potential for unrecorded modern heritage assets of this date within the Site.

Future Baseline

- 11.4.75 If the Proposed Development was not to proceed, there would be no change to the baseline condition of the site beyond natural processes and it would continue to be used for commercial forestry.
- 11.4.76 Climate change could affect naturally formed peat deposits leading to the destruction of paleoenvironmental evidence. This might result in the loss of previously unrecorded cultural heritage assets.

Other impacts of climate change on buried remains might result from increased rainfall and fluctuating temperatures, with the sequence and frequency of natural soil saturation and desiccation changing the preservative conditions. This might result in damage or loss of organic artefacts. For upstanding remains, such change has the potential to result in increased water penetration, which may then cause/accelerate erosion/decay of historic fabric.

11.5 Embedded and Standard Mitigation

- 11.5.1 The Proposed Development has undergone an iterative design process to avoid direct impacts on known heritage assets within the Site boundary, as far as reasonably practicable. Impacts are considered with due regard to embedded mitigation measures.
- 11.5.2 Embedded mitigation measures are those measures that are inherent to the Proposed Development. This includes mitigation by design (also known as Primary Mitigation), implemented through design iteration works as described in **Chapter 2: Design Evolution and Alternatives**.
- 11.5.3 During the scoping stage, it was identified that T1 of the Scoping Layout has the potential to impact on the setting of Sir John de Grahams Castle (**SM4278**). T1 was moved approximately 0.75km to the north east to reduce visibility from this asset.

11.6 Scope of Assessment

- 11.6.1 **Table 11-6** provides a summary of which receptors and impacts have been scoped in or out of the assessment.



Assets within the Site

- 11.6.2 Cultural heritage assets within the Site boundary were assessed in order to determine any direct physical and indirect physical impacts.

Assets outwith the Site

- 11.6.3 All nationally significant designated assets within 10km of the proposed wind turbines were considered during the scoping phase for potential impacts on their setting and were subjected to a Cultural Heritage Appraisal (an updated appraisal in line with submitted layout can found in **Technical Appendix 11.2**). The scope of assessment of cultural heritage assets is set out in **Table 11-6**, in line with the advice received from HES and Stirling Council (**Table 11-1**). A full list of assets scoped in for assessment due to potential impacts on their setting can be found in **Table 11-8**.

Table 11-6: Summary of Assessment Scope

Receptor/Impact	Scoped In?		Comments
	Construction	Operation	
Direct Impacts on the Setting of Heritage Assets	No	Yes	Construction activities are temporary and reversible in nature. While temporary structures (site compounds, cranes, scaffolding) may be visible, their short-term presence does not constitute a significant effect on the setting of designated heritage assets. The operational development has the potential to introduce permanent changes to the settings of heritage assets where setting contributes to their cultural significance, including changes to views, landscape character, and the ability to understand and appreciate these assets in their historic context. These effects are assessed in Section 11.7.
Direct (physical) Impacts	Yes	No	Ground-breaking works (excavation, piling, landscaping, access routes, compounds) have the potential to physically damage or destroy archaeological remains and impact the fabric of historic structures. All construction groundworks are assessed for their potential to disturb known and potential buried archaeology, and for impacts on the structural integrity of adjacent historic buildings. Assessment methodology and results are presented in Section 11.7.



Receptor/Impact	Scoped In?		Comments
	Construction	Operation	
			No operational activities involve ground disturbance or physical contact with heritage assets. All direct physical impacts will occur during the construction phase only. Ongoing maintenance activities will be confined to existing hard surfaces and previously disturbed ground.
Indirect Physical Impacts	Yes	No	Indirect impacts during construction include potential ground dewatering or waterlogging affecting buried archaeological remains, vibration impacts on historic structures, changes to access or use of heritage assets, and dust deposition on sensitive fabric. These are particularly relevant where archaeological resources are sensitive to hydrological change or where historic buildings lie within 50m of construction activities. Assessment provided in Section 11.7.
Cumulative Effects	No	Yes	There are no anticipated cumulative effects resulting from construction impacts from the Proposed Development. Therefore, they are scoped out of assessment. Where multiple developments combine to affect an asset's setting, this is identified and assessed within Section 11.8.

Decommissioning

- 11.6.4 As described in **Chapter 3: Project Description** effects associated with the construction phase can be considered to be representative of reasonable worst-case decommissioning effects, therefore no separate assessment of the decommissioning phase is presented in this chapter.

11.7 Assessment of Potentially Significant Effects

Construction

- 11.7.1 Direct Impacts on the setting of designated heritage assets as a result of construction activity are considered to be minimal at most and temporary in nature. The worst-case scenario for settings impacts, comprising the completed Proposed Development, are considered under **Potential Operational Effects**.
- 11.7.2 Indirect physical impacts have been considered for all assets located within the Site. Due to the distance of each asset from any construction works and the nature of the construction works, no indirect impacts are expected on the assets located within the Site.



- 11.7.3 Direct (physical) impacts would comprise any groundworks or other ground disturbance undertaken as part of the construction phase of the Proposed Development. Specific activities which have the potential to cause impacts through the construction phase of the Proposed Development include the excavation of wind turbine foundations, substation compounds, crane hardstands, borrow pits, cable trenches, and any areas of cut and fill. This will also include the construction and maintenance of access tracks, laydown areas and working compounds.
- 11.7.4 Where ground disturbance takes place, these activities would remove, truncate or change any heritage assets located within the area of ground disturbance. Damage to heritage assets caused in this way would be permanent and irreversible.

Known Remains

- 11.7.5 There are four assets within the Site boundary which could be directly impacted by the Proposed Development; **SLR60**, **SLR61**, **SLR106** and **SLR107**.
- 11.7.6 **SLR60** and **SLR61** is a medieval and/or post-medieval farmstead and enclosure at the southern end of the Site, immediately adjacent to an existing track which is to the north west of the proposed temporary construction compound. The farmstead and enclosure are in ruinous condition. Both assets are of negligible heritage significance as they are of little heritage interest and the ability to interpret their archaeological context has been eroded. There is a very narrow strip of proposed widening on the north eastern side of the track which has potential for direct physical impacts of the existing remains of the assets. The track widening has the potential to remove elements of the fabric of the assets which will further erode the ability to understand and appreciate the asset which would result in a medium adverse magnitude of change. The significance of effect on **SLR60** and **SLR61** would, therefore, be **negligible**. This is **not significant** in EIA terms.
- 11.7.7 **SLR106** is a low, rubble stone wall of unknown date but is likely a post-medieval boundary and was identified as part of the walkover in August 2025. The northern portion of the wall is approximately 50m to the east of the hardstanding associated with T2. The southern portion is approximately 7m from the existing access track, adjacent to a section of proposed widening. The visible sections of the wall appear to be in moderately good condition, but the southern section has been truncated by the forestry track. It is likely that the wall no longer functions as a boundary or enclosure wall. The asset is of negligible heritage value as it is of little heritage interest. Due to its proximity to T2, there is potential for direct physical impacts on the construction of T2's hardstanding area, which could change the fabric of the asset and would erode its cultural significance to a very minor extent. Similarly, the widening of the track at the southern end of the asset could have similar changes to this section of the wall. One or both direct impacts would have a low adverse magnitude of change on the asset as the majority of the wall would remain and the ability to understand and appreciate it would still be possible. On an asset of negligible heritage value, the significance of effect would be **negligible**. This is **not significant** in EIA terms.
- 11.7.8 **SLR107** is also a low, rubble stone wall which connects to **SLR106** and was identified in August 2025. It has also been truncated by the existing forestry track and is approximately 5m from a proposed area of widening. As with **SLR106**, the asset is of negligible heritage value as it is of little heritage interest. The south eastern part of the existing wall has the potential for direct physical impacts from the widening of the track which would erode its cultural significance to a very minor extent through changes to the fabric on a small section of the asset. This would have a low adverse magnitude of change as the majority of the asset would still be



understood and appreciated. On an asset of negligible heritage value, this would be a **negligible** significance of effect. This is **not significant** in EIA terms.

Unknown Remains

- 11.7.9 The potential for unknown archaeological remains to survive within the commercially forested areas of the Site is low for all time periods. The processes involved with commercial forestry, such as planting, felling and the rooting from trees, would have eroded the archaeological context of any sub-surface archaeological deposits. Any surviving archaeological deposits would be of negligible cultural heritage significance as the ability to understand them in their archaeological context would be removed. The subsequent removal of these deposits would be a high adverse magnitude of change, resulting in a **minor** significance of effect. This is **not significant** in EIA terms.
- 11.7.10 The area at the summit of the hill within the Site has not been subject to previous development. The only evidence of human activity is a trig point. There is low potential for unrecorded heritage assets to survive as sub-surface remains within this undeveloped area. Prehistoric settlement remains such as hut circles and roundhouses are usually identified on lower slopes, close to a water source and on more fertile soils. Furthermore, there is no evidence of earthworks which would indicate a defensive structure such as a prehistoric (or later) fort. Since the area does not appear to have been previously subject to agricultural practices, any evidence of earthworks would likely be visible. It is also unlikely that any medieval archaeological deposits would be present in the unforested area. The baseline determined that medieval assets in the study area were predominantly related to ecclesiastical, defensive, domestic and agricultural activity, and are distributed on the lower slopes and in areas of suitable farming land. Similarly, post-medieval assets within the study area are associated with agricultural practices, with evidence of survival of upstanding remains in the forested areas. These would be visible in the unforested areas if they were present owing to lack of development in this area. Should archaeological remains of any period be present in the unforested area, they would likely survive in a better condition than those in the forested areas. Archaeological remains from all periods would likely be of local importance and therefore a low cultural significance. As there is no infrastructure associated with the Proposed Development planned in the unforested area, the magnitude of change would be neutral. On assets of low cultural significance, this would result in a **negligible** significance of effect. This is **not significant** in EIA terms. Due to the lack of infrastructure in this area which would cause construction impacts, unknown heritage assets in this area have not been added to **Table 11-7**.
- 11.7.11 There are no impacts on known or unknown heritage assets which would be considered as 'significant' in EIA terms as a result of the construction of the Proposed Development. Proposed mitigation is discussed in Section 11.9.

Table 11-7: Potential Construction Impacts

Asset	Infrastructure	Cultural Heritage Significance	Magnitude of Change	Significance of Effect	Is the Effect Significant In EIA Terms?
Remains of farmstead (SLR60)	Track	Negligible	Low Adverse	Negligible	No
Remains of enclosure (SLR61)	Track	Negligible	Low Adverse	Negligible	No



Asset	Infrastructure	Cultural Heritage Significance	Magnitude of Change	Significance of Effect	Is the Effect Significant In EIA Terms?
Rubble stone wall (SLR106)	Hardstanding of T2 and Track	Negligible	Low Adverse	Negligible	No
Rubble stone wall (SLR107)	Track	Negligible	Low Adverse	Negligible	No
Unknown remains of all periods	Primary site infrastructure (forested area)	Negligible	High Adverse	Minor	No

Potential Operational Effects

- 11.7.12 Impacts during the operation of the Proposed Development will relate to changes within the setting of cultural heritage assets. In agreement with HES and Stirling Council's Archaeological Advisor, the assets listed in **Table 11-8** have been scoped in for assessments on their setting. The justification for the assets scoped out of the detailed assessment is provided in **Technical Appendix 11-2**.

Table 11-8: Assets Scoped in for Further Assessment of Operational Impacts

Designation Reference	Designation Title	Type of Asset
SM4278	Sir John de Graham's Castle	Scheduled Monument
SM2719	Waterhead, two standing stones 800m ENE of	Scheduled Monument
SM2492	Todholes, cairn 1000m NNE of	Scheduled Monument
SM4491	Todholes, cairn 1300m NNW of	Scheduled Monument
SM6553	Dundaff Hill, mound 550m NE of summit	Scheduled Monument

Sir John de Graham's Castle (SM4278)

- 11.7.13 Sir John de Graham's Castle (also known as Dundaff Castle) is the remains of a likely medieval motte, and a potential surrounding settlement. The asset comprises a square-shaped enclosure, surrounded by a moat, which reaches up to 2m in depth. Upcast from the moat has created a platform to the south east of the asset. Analysis of the asset has identified four ranges of buildings within the enclosure, which are now only surviving as ruinous and subsurface remains.
- 11.7.14 The entrance to the asset would have been from the north east, where a soil abutment or causeway remains, likely once having supported a drawbridge. There is evidence of two buildings on either side of the entrance pathway, which would have surrounded an open yard. There is evidence of ridge and furrow along the eastern edge of the castle, and further features surrounding the castle include sluice gates to control the water level in the moat and a potential fish pond.
- 11.7.15 Historically, the castle is associated with Sir John de Graham of Dundaff. Graham was a 13th century noble, believed to have fought alongside William Wallace at Stirling Bridge and the Battle of Falkirk. Graham died at the Battle of Falkirk in 1298, so we can presume the castle was constructed prior to this date, potentially dating



to as early as 1237 when the barony of Dundaff is known to have been within the possession of the Graham family (RCAHMS, 1963). The date of abandonment for the asset is unknown, however, the 1791-1799 Statistical Account of Scotland refers to the castle as ruins. As such, it can be determined to have been abandoned before this period.

- 11.7.16 The asset's cultural significance partially derives from its intrinsic value. The physical remains of the asset, as well as any further information gained from future archaeological investigations, have the potential to deepen our understanding of medieval defensive architecture, medieval society and the day-to-day life of those living within the asset. Further archaeological investigations have the potential to identify the date of construction and abandonment of the motte.

Setting

- 11.7.17 The castle is situated on a small south western facing rise of land, at approximately 250m AOD. The land extends from the south west of Cairnoch Hill, which rises in a north easterly direction before reaching a peak at 413m AOD. Due to its height and difference in elevation from the motte, Cairnoch Hill provides a natural defence to the north of the asset, providing protection from approaches from this direction.
- 11.7.18 The castle would have been positioned to overlook Endrick Water, located approximately 0.56km to the west and the River Carron, which would have run approximately 0.5km to the south. Furthermore, the Roy Military Survey of Scotland map, dated to 1747-1755, shows a road running through the valley to the south of the asset, noted as running between Fintry and Falkirk. The asset would have been placed above the flood plain of the rivers and above the road, providing a defensive position above the lower lying land. As such, views from the asset are long distance and are focussed along the Carron Valley, which runs roughly east to west, following the path of the road and the key approach to the castle. The castle would have commanded views along the valleys associated with Endrick Water and the River Carron, monitoring and controlling access through these key routeways through the landscape.
- 11.7.19 These rivers were dammed in the early 20th century, and the Carron Valley reservoir now substantially dominates the landscape to the south of the castle, which alters the perception of the historic landscape. The reservoir largely truncates many sections of the historic routeway between Fintry and Falkirk, notably beneath Sir John de Grahams Castle (**SM4278**). Roy's Military Map of 1747-1755 demonstrates this original route, which has likely been truncated, at least in part, by the reservoir. The modern B818 is unlikely to follow the routeway in its entirety, however, it does provide a representation of this historic route through the valley. As such, whilst altered by the presence of the reservoir these outward views are still important to the ability to understand, appreciate and experience the asset's setting, demonstrating its defensive position and ability to monitor routeways.
- 11.7.20 Carron Valley is bound on the north by the Gargunnock Hills, and the south by the Campsie Fells, which create distinctive visual borders along the valley sides. As such, views to the north and south are restricted to within the valley itself.
- 11.7.21 The entrance to the castle is to the north east, across a small causeway. Cairnoch Hill rises directly to the north and north east, and as such, the approach to the asset would have had to come from the east or west before turning south west to cross the causeway. This positioning would have afforded some protection from approaches from the north east. Similarly, when exiting the castle, whilst the causeway faces north east, those exiting must then turn immediately west or east in order to avoid having to cross over Cairnoch Hill. It is therefore not a key contributor to setting as views would have been largely outward to the south, east



- and west. Whilst the positioning of the castle with Cairnoch Hill to its immediate north east would have offered it a degree of shelter, its outward views are considered to be more important to the positioning and wider setting of the monument.
- 11.7.22 The long-distance approach towards the asset would have been along the length of Carron Valley, from the east or the west. From the east, when approaching through the valley towards the asset from Falkirk, the base of Cairnoch Hill would likely obscure views until within the immediate landscape. However, when approaching from the west from Fintry, the castle was likely visible from a much longer distance. The original approach through the valley may no longer exist due to the presence of the reservoir, however, the modern B818 follows an approximate route and acts as a key point to appreciate the approach towards the asset.
- 11.7.23 Work by Forestry Commission Scotland in 2017 notes that the castle was along the main route from the royal hunting forest of the Forth valley to Fintry (Trove, 2017), which likely ran from the east, along the valley of the River Carron. Furthermore, the Carron Valley forms the route through Fintry to Falkirk, to the east. This was the location of the Battle of Falkirk in 1298 and is where Sir John de Graham is thought to have died. Graham fought alongside William Wallace against the cavalry of Edward I and was one of the most notable Scottish casualties of the battle. As such, there is a historic and symbolic connection between the castle and the route through the hills, as the supposed final route taken prior to his death.
- 11.7.24 At the time of its construction and occupation, when the walls of the asset were still extant, it may have been more visible when approaching. However, the ruinous nature of the asset means that it is difficult to identify from a distance. It may have been that the asset was visually dominant when moving through the valley, consolidating the control and command the inhabitants of the asset would have had over the valley. Whilst commercial forestry does obscure the location of the asset to some degree when approaching from the east and west, the asset, although ruinous, is still visible when approaching along the B818 from the east. In the event of the removal of the commercial forestry, it is likely that the asset would be more visible upon this approach. Currently, the castle is not visible when viewing from the immediate south, however, this may be due to the denuded nature rather than being intentional.
- 11.7.25 The castle is situated within the historic lands of the de Graham family, which would have been of significance to the inhabitants. The asset is situated approximately 2km to the east of Fintry Castle (**SM7085**), which, whilst at least 200 years later in date than Sir John de Graham's Castle, also belonged to the Graham family. Whilst views between the two assets are not currently possible due to the intervening forestry, there may have been deliberate intervisibility between the two assets at the time of their occupation. The connection between the two assets, spatial and potentially visible, would contribute to their cultural significance.
- 11.7.26 Fintry Motte (**NHRE: 45307**) is located approximately 6.75km to the west of Sir John de Graham's Castle. Unlike Fintry Castle (**SM7085**), Fintry Motte did not belong to the Graham family and is believed to have been the seat of the Earls of Lennox during the medieval period. If inhabited at the same time as Sir John de Graham's Castle, both assets being positioned along the same valley would be of importance. Both assets would have been able to monitor the boundary between their land, and monitor and control access along the valley between them.
- 11.7.27 Again, commercial forestry limits views from Sir John de Graham's castle towards the location of Fintry motte and visibility may not have been achievable historically due to the topography of the valley. However, long-distance views to the east along



the valley are still able to be perceived, and any connection to contemporaneous assets is still able to be understood.

- 11.7.28 The modern landscape surrounding the castle has been significantly altered since the asset's construction. Whilst the valley remains rural, Cairnoch Hill to the north is covered in commercial forestry and the introduction of the reservoir has flooded the fertile land to the south. These aspects of the modern landscape form a distraction to the asset's setting, as they have altered the original landscape and changed key views when looking outward from the asset and towards the east and west, along key routes that the asset would have controlled. The lifecycle of commercial forestry is that it would be periodically felled and replanted, and so the period where views to the north would be opened would be limited. However, the presence of the reservoir within the valley fundamentally alters the setting as it limits the ability to understand and appreciate the monument's intended position and its relationship with the original watercourses prior to the introduction of the reservoir. Therefore, the relationship with the asset and the low-lying landscape context has been diminished.
- 11.7.29 Furthermore, multiple wind farms cover the Gargunnock hills, bounding the north of Carron Valley. As noted in **Figure 11.4e**, Earlsburn Wind Farm is located 1.8km to the north of the asset, and Earlsburn North Wind Farm is located 3.1km to the north west of the asset, with a combined 23 wind turbines visible. **Figure 11.4** shows that for the case of 22 of these wind turbines, the tower, hub and blades are visible. A single wind turbine is only visible as a blade tip. Earlsburn and Earlsburn North Wind Farms, to the north and north west, create an element of distraction when approaching the asset through the landscape and when looking westwards along the valley. As outlined, these approaches form a key part of our understanding of the placement of the asset within the landscape, the relationship with other contemporary assets, and the asset's dominance and command of the valley. Thus, the currently operational wind turbines within the landscape contribute negatively to the asset's cultural significance.

Key Contributing Aspects of Setting to the Asset's Significance

- 11.7.30 The following aspects of the asset's setting contribute positively to its cultural significance:
- Views south, east and west from the asset, along the Carron Valley, demonstrating the asset's ability to monitor and control the landscape;
 - The asset's slight elevation above the flood plains of the nearby rivers, demonstrating its defensive position above the local landscape;
 - Views south west and northeast along the entrance causeway, comprising the immediate entrance and exit from the asset;
 - Views towards the asset when approaching along the B818 from the east, which represent the historic approach through the valley, with local dominance in these views being of particular importance;
 - Views when approaching the asset along the B818 from the west, representing the approach from both Fintry Motte and Fintry Castle. The asset's local dominance in these views would be of particular importance; and
 - Views towards the asset from the general Carron Valley and the Endrick Water valley, with the asset's prominence in these views being demonstrative of the historic control it would have had over the valley.



- 11.7.31 The following aspects of the asset's setting contribute negatively to its cultural significance:
- The presence of Earlsburn and Earlsburn North Wind Farms in views when approaching the asset;
 - The commercial forestry surrounding the asset; and
 - The presence of the Carron Valley Reservoir in views to the south, south east and south west.

Impacts

- 11.7.32 The ZTV (**Figure 11.2**) demonstrates a varied visibility of the Proposed Development, with up to four wind turbine blade tips visible from the asset.
- 11.7.33 The photomontage shows three wind turbines visible from the exit of the asset (**Figure 11.4h**). The closest wind turbine would be T1, located approximately 1.1km to the north east of the asset. The remaining three wind turbines (two hubs and a blade) shown on **Figure 11.4h** would be within views to the north east and east, across Cairnoch Hill.
- 11.7.34 The turbines would not be present in views from the asset when looking out across Carron Valley to the south, east and west with the Proposed Development situated behind the viewer. The asset's elevated and defensive placement above the flood plain, as well as the command and control it would have had over the valley are able to be understood, experienced and appreciated. Whilst the wind turbines would be in relative proximity to the viewer, located behind them to the northeast, they are of enough of a distance to not form a distraction and would not cause the viewer to turn away from the valley.
- 11.7.35 When approaching from the east, along the modern B818, the Proposed Development would be visible. However, the asset is not visible from long distance views when approaching from the east due to the topography of Cairnoch Hill. The motte appears to be deliberately sheltered from this approach by the hill, and as such, the presence of wind turbines does not impact the long distance approach. When closer to the asset, the turbines may be present in peripheral views. However, they would be to the north and northeast of the viewer. They may be peripheral in views and cause some slight distraction in views when approaching, but would not impact the ability to understand, appreciate or experience the assets local dominance in the landscape or its defensive positioning.
- 11.7.36 The wind turbines would be present in views when approaching from the west, as shown in **Figure 11.5b**. **Figure 11.5** is demonstrative of views towards the asset when approaching along the B818, with **Figure 11.8b** demonstrating the view towards the asset from Fintry Castle. This also includes views when approaching from the direction of Fintry Castle (**SM7085**), which was owned by the same family. Currently, the location of the castle is hard to distinguish within the landscape when approaching due to the eroded nature of the remains and the screening of the asset by commercial forestry plantation along the majority of the approach. Whilst forestry plantation has a felling cycle which means that the screening may not always be in place, the motte itself would still be difficult to distinguish when approaching at its current nature.
- 11.7.37 Due to the elevated location of the Proposed Development, it would be the most prominent modern feature in the landscape when viewed on the approach from the west and would likely be a visual draw. However, where the view of the asset from Fintry Castle (**SM7085**) includes the Proposed Development, it is predicted that the proposed wind turbines would be offset enough that it would maintain the ability to



- understand, appreciate and experience the relationship between Sir John de Graham's Castle and Fintry Castle, albeit whilst forming a minor distraction. Whilst diminished in size due to erosion, the castle would still be visible and its commanding placement within the landscape would still be understood. The wind turbines, and the dynamic movement of the blades, may act as a distraction in the approach to a clearly discernible degree, drawing the eye from the already eroded castle. However, the ability to understand, appreciate, and experience the asset's approach and its connection with Fintry Castle would be retained, albeit with the distraction of already operational modern wind turbines, such as Earlsburn and Earlsburn North.
- 11.7.38 The proposed wind turbines, especially T1, would be most prominent when exiting the asset along the north east facing causeway. T1 would be present in direct views, forming a distraction when exiting the asset (**Figure 11.4h**), with T2 and T3 likely drawing the eye more eastwards due to their proximity. However, after the immediate exit, the landscape forces the visitor to turn south east or west, in order to avoid Cairnoch Hill. The wind turbines would then be outside of the field of view and would no longer distract from the experience of exiting the asset. As such, the proposed wind turbines would have a clearly discernible distraction to the immediate exit from the asset, but this distraction would not be present as soon as the visitor leaves the causeway. Our understanding of the use of the asset and the movement of historic people through the asset is partially informed by the approach to the asset and exit from it, and as such, the proposed turbines within views along this exit would form a small distraction to the ability to understand, appreciate, and experience the way the castle was used by the historic population.
- 11.7.39 Three aspects of the asset's setting would be subject to impacts as a result of the Proposed Development, albeit to differing degrees. These comprise slight distractions when approaching from the east, a clear distraction when approaching from the west, and a discernible distraction to the right of the viewer as they exit the asset. The introduction of the proposed wind turbines into these views would reduce the ability to understand, experience and appreciate the asset's approaches, diminishing the ability to understand its commanding presence, its historic connection to the landscape, and its defensive nature. All other aspects of the asset's setting would remain unimpacted or negligibly affected by the Proposed Development. As such, it is assessed the cultural significance of the asset would be eroded to a clearly discernible extent.
- 11.7.40 It is considered the magnitude of change as a result of the Proposed Development would be Medium Adverse, which would result in a **Moderate** significance of effect. This is considered **significant** in EIA terms, as whilst the key outward views from the asset over the landscape to the south are unimpacted, the ability to understand, appreciate, and experience the other aspects of the asset's setting would be impacted albeit to varying degrees.

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- 11.7.41 When considering the integrity of the setting of Sir John de Graham's Castle, there is a clear distraction to the ability to understand, appreciate and experience multiple aspects of the asset's setting, as a result of the introduction of the Proposed Development into the landscape.
- 11.7.42 There would be a perceivable impact upon the approach to the asset and upon exiting the asset, as the Proposed Development would introduce modern infrastructure in close proximity to the asset at a larger scale than already present within the environment. This impact would change our ability to understand, appreciate, and experience the way that the historic population used the castle, the



- connection between the castle and the road to Fintry and Falkirk, the relationship between other defensive assets owned by both the Graham family and neighbouring families, and the assets dominance within the landscape.
- 11.7.43 Despite this, the ability to understand, appreciate, and experience the aspects outlined above would not be fully removed. The wind turbines would act as a distraction but would not remove or obstruct views towards these key aspects of the asset's setting. These aspects of the asset's setting would remain legible.
- 11.7.44 In addition, key outward views from the asset, to the south, south east and south west would not impacted at all. These outward views form a large part of the way we understand, appreciate, and experience the asset's command, control, and placement over the valley below and the historic routeway through the valley itself. The way that the inhabitants would have been able to monitor for approaching forces, defend themselves, and respond to threats would continue to be easily understood. The ability to understand, experience and appreciate the asset's command and control over the valley would be retained.
- 11.7.45 On balance, it is considered that the ability to understand, appreciate, and experience the asset's setting is adequately retained. As such, when viewed within the context of NPF4 Policy 7 (h), significant adverse impacts on the integrity of the setting of the scheduled monument are avoided and the integrity of setting is retained.

Waterhead, Standing Stones (SM2719)

- 11.7.46 The standing stones at Waterhead (**SM2719**) comprise two standing stones, likely erected in the late Neolithic or Bronze Age. They are located on a small rise within an area of commercial forestry, on the low, northern slope of Brown Hill, and would have, prior to the introduction of commercial forestry, had outward views over the River Carron and its valley to the north, prior to the installation of the reservoir. The stones are approximately 1.8m apart and together are aligned NNE to SSW. The southern stone is 1.5m high and 1.2m wide, tapering at the top and base. The northern stone is almost recumbent but packing stones at the base indicate that it was once upright and measures 1.8m in height and up to 1m in width. The downward-leaning face has seven cup markings, but it is unclear if these are natural or man-made. The HES scheduling description notes that the current leaning position of the northern stone has been attributed to possible disturbance from an adjacent cist (**NHRE: 45313**), although there is no clear evidence for this. As a Scheduled Monument, the monument is considered to be of high cultural significance.
- 11.7.47 The cultural significance of standing stones partially derives from their intrinsic value; if subject to archaeological excavation, standing stones have the potential to enhance our understanding of prehistoric ritual practices.
- 11.7.48 Standing stones began to appear in Scotland in the Neolithic period and continued into the Bronze Age. They are generally associated with the advent of farming and have often had a mix of interpretation. They have been theorised to be locations where ceremonies and rituals took place, as astronomical guides, meeting places or cultural focal points which tie settlements to farmland. They may also have served as boundary markers. However, there is no clear evidence for which interpretation is true in the case of Waterhead Stones (**SM2719**). Contextually, standing stones can derive cultural significance from their landscape setting. They are often visible, focal points in the landscape near flat arable land and water courses but can also often be situated in elevated positions with intervisibility between the settlements that erected them and other, contemporary monuments in the landscape.



- 11.7.49 Due to the asset's current position in dense commercial forestry its intended setting is unclear. However analysis indicates that the setting of the monument is its location on a slightly elevated position, at the northern base of Meikle Bin, overlooking the course of the Carron River to the north east, north, west and south west. The asset also overlooks the confluence of its associated tributaries and burns such as Clachie Burn to the west and Bin Burn to the south west.
- 11.7.50 The relatively short form of the stones is such that they would be difficult to discern in long-distance views towards them from these parts of the landscape. The stones would not be discernible in the long-distance approach from the main body of the Carron Valley, approximately 2km to the north east, where the Carron Valley Reservoir is today and as such, it is unlikely that they would have acted as way markers for a long-distance approach through the Carron Valley.
- 11.7.51 The stones may be more visible from the immediate landscape and could mark the confluence between Bin Burn and the River Carron, or the place where the River bends around the northern extent of Drove Hill, away from view of the main valley. These views of the stones would be from the immediate approach to the south west and north east.
- 11.7.52 Key views outward from the asset may have been over the watercourses and the arable land. The ability to experience outward views over these water courses and the flat arable land, which was likely used by the communities which erected the standing stones, contributes to our understanding and appreciation of the relationship between the monument and these areas of likely settlement. A potential prehistoric hut circle (**NRHE: 45312**) is recorded approximately 0.5km to the north west, on the northern bank of the River Carron. Whilst it is unclear if the hut circle is contemporary to the erection of the standing stones, it demonstrates that there was likely a prehistoric settlement along the northern banks of the river before the construction of the modern Carron Valley Forest, which has since removed evidence of settlement.
- 11.7.53 The slight elevation of the asset would have allowed views along the length of the Carron Valley, which is narrowed in the immediate vicinity of the asset before opening out to the east. The Carron Valley Reservoir is located to the east of the asset, however, it would not have been present during the time of the asset's construction. Instead, views from the standing stones would have encompassed agricultural land to the east along the base of the valley. Whilst the landscape has changed, the more open views to the east can still be appreciated. These views to the east are backdropped by Cairnoch Hill, which creates a visual border to the valley.
- 11.7.54 Long-distance views are restricted to the west due to the hills of Dungoll, Dunbrach, and Campsie Muir and as such, key views in this direction would have been localised, focussed on arable land or areas of settlement.
- 11.7.55 The NNE to SSW alignment of the two stones indicates an alignment with the River Carron, highlighting the key relationship between the asset and the watercourse. The orientation of the hills also frames certain landscape features. To the south of the asset, Meikle Bin and Little Bin are framed between the stones (**Figure 11.10c**). To the north of the asset, Gartcarron Hill is framed between the stones (**Figure 11.10e**). Due to the placement of the stones within dense commercial forestry, it is unclear what the exact orientation of the stones is with regard to the surrounding hills and as such cannot be ascertained at this current time. Nonetheless, the framing of key landscape features between the stones (as implied by **Figure 11.10c** and **Figure 11.10e**) contributes to our understanding of the usage of the asset and its relationship with the landscape.



- 11.7.56 As noted, the asset sits within the Carron Valley forest, a large area of commercial forestry located along the southern bank of the Carron Valley Reservoir. Currently, the commercial forestry screens outward views from the asset in all directions. However, due to the felling cycle of commercial forestry, there may be times when these views would be unobstructed.
- 11.7.57 **Figure 11.10f** indicates that the four proposed wind turbines would be visible in north east facing views from the asset. The wind turbines would be present in views along the River Carron towards the open Carron Valley and reservoir to the north east (**Figure 11.10f**), as well as potentially featuring behind the stones when viewing along their axis. The wind turbines have the potential to draw the eye away from the open valley and the eastern extent of the river; however, the wind turbines would be placed along the visual border of the valley, atop Cairnoch Hill, and not within the valley itself. The distraction would be minimal and at the edge of the view. Views in this direction beyond the river valley do not contribute significantly to how the asset is understood, appreciated and experienced.
- 11.7.58 The key views from the asset over the low lying landscape to the north, including the potential prehistoric areas of agriculture and settlement, which are now occupied with commercial forestry, would not feature the Proposed Development. Furthermore, views of the hills to the north and south, which may be framed by the two standing stones would be unobstructed. As such, should the commercial forestry be removed, the connection between the asset, water courses and the river valley would retain the ability to be appreciated. It is considered that long ranging views along the river valley to the east may have a small contribution at most to the cultural significance of the asset. The wind turbines would not distract away from or interfere with the majority of the factors of the asset's setting that contribute to its cultural significance. The introduction of the Proposed Development in this area would cause a distraction to a negligible extent at most.
- 11.7.59 As the asset is of high cultural significance and the Proposed Development would impact a single aspect of the asset's setting, the magnitude of change would be Low Adverse. This would result in a **Minor** significance of effect, which is considered **not significant** in EIA terms.

Cairns

- 11.7.60 Cairns are man-made piles of stones and rocks. Those dated to the prehistoric period are often interpreted as funerary monuments and form key aspects of ritual landscapes, which have been created and remain in use over multiple centuries. Contextually, they are often placed close to contemporary settlements, adjacent to cultivated land, on significant landscape features, and are often close to watercourses. Cairns are often the only surviving prominent remains of early societies, where settlements may have been destroyed, replaced, or are less visible in the landscape. Funerary cairns have an inherent link with the surrounding landscape and those living within it, as they represent a tangible link between the living and the dead for the societies that constructed them. As such, views towards the cairns and views from the cairns over the landscape are of high significance. Intervisibility between contemporary funerary monuments was likely key, forming a prehistoric funerary and ritualistic landscape that can still be understood today.
- 11.7.61 The setting of a cairn enables us to understand, appreciate, and experience its ceremonial function and as such, is integral to its cultural significance.

Todholes, cairn 1000m NNE of, (SM2492)

- 11.7.62 The asset comprises a prehistoric cairn, described as being 19m in diameter and 1.2m in height. There is evidence of a stone kerb along the southern edge and



- quarrying within the south east and north west. The cairn has not been dated, nor does any archaeological investigation appear to have been undertaken on it. The cairn holds archaeological value, with archaeological investigations having the potential to further our understanding of prehistoric burial assets and practices, as well as potentially holding information about the prehistoric population of the area. Furthermore, the cairn itself may be overlying palaeoenvironmental remains which have the potential to further our understanding of the environment at the time of the asset's construction.
- 11.7.63 The asset's setting also contributes to its cultural significance. The cairn is situated on a small platform in the landscape, on a slight rise above the immediate flood plain of Endrick Water, which is located 0.5km to the east. Endrick Water runs from the Gargunnock Hills, which are located to the north of the asset, and runs to the south meeting with Carron Valley reservoir and turning west continuing towards Fintry through the valley.
- 11.7.64 The views out from the asset are focussed along the length of Endrick Water, both north towards the Gargunnock Hills (such as Cringate Law, Hart Hill, and Ling Hill) and south towards Carron Valley and the Campsie Fells. To the north, the turbines of Earlsburn and Earlsburn North Wind Farms are visible along the crest of the hills, with 14 wind turbines visible collectively. To the south, the modern Carron Valley reservoir dominates views, backdropped by the Campsie Fells and the dominant Meikle Bin. Before the construction of the reservoir, the asset would have focussed on the Carron Valley itself, with the River Carron running through it. The open landscape to the south draws the eye to the valley, and to the prominent peak of Meikle Bin, and as such, these southward views are considered a key aspect of the assets setting.
- 11.7.65 The valley of Endrick Water is bordered by Stronend, a hill to the west, and Cairnoch Hill to the east. Whilst these aspects of the landscape do not appear to be the key focus of the views out from the asset, they form the border to the Endrick Water valley and as such act as a geographic boundary to the setting of the asset. They act as a visual funnel, channelling outward views southwards and focussing them on the views of the open landscape to the south.
- 11.7.66 The main approach towards the asset would be along the Endrick Water, most likely approaching from the Carron Valley area to the South. Whilst the asset is on a slight rise, the undulating landscape ensures that it is not visible from a distance when approaching from the lower ground to the south. The hills to the east (Cairnoch Hill), north (The Gargunnock Hills), and the west (Stronend) enclose the Endrick Water Valley and the person approaching the cairn. This feeling of enclosure likely formed part of the experience when approaching the cairn through the landscape. The approach from the south is currently backdropped by Earlsburn Wind Farm and Earlsburn North Wind Farm (**Figure 11.7e**), with the wind turbines particularly prominent along the tops of the Gargunnock Hills. Craigengelt Wind Farm is visible within views to the east of the asset (**Figure 11.7b**).
- 11.7.67 The asset is only visible in the immediate approach from the south, indicating that, unlike cairns situated on high points in the landscape, this asset was unlikely to have been visible or act as a long distance way marker. Instead, the views of the asset from within the immediate landscape are likely of significance compared to any views along a long distance approach.
- 11.7.68 The asset is situated within a wider prehistoric landscape. Whilst a prehistoric cairn (**SM4491**) is located approximately 0.4km to the north west on a small rise in the landscape, there is no visibility of **SM4491** from the asset at present. This may be intentional, due to the higher cairn's (**SM4491**) placement further back from the edge of the rise in the landscape or it may be due to the denuded nature of the



- cairn. Conversely, views of the asset from **SM4491** are possible. Together, the assets create a small funerary landscape within the Endrick Water valley and views between the assets assists our understanding, appreciation and ability to experience the relationship between the cairns and the broader prehistoric funerary landscape.
- 11.7.69 There are a number of hut circles and roundhouse footings (**Figure 11.1, SLR16, SLR14, SLR34, SLR15**) along the banks of Endrick Water, with the closest being approximately 0.14km to the south east of the asset. Whilst it is unknown if the settlement and the cairn are contemporary, the presence of the earlier prehistoric asset (or assets) within the landscape may have informed the placement of the latter. For settlers, being able to see the evidence of earlier prehistoric funerary activity may have been important. Alternatively, the cairn may have been constructed by those that lived within the settlement, indicating that proximity and visibility of the asset from their settlement was important. As such, views between the cairn and the areas of settlement contribute to the asset's cultural significance. The asset's placement with relation to the prehistoric settlement helps us understand the cairns importance to the prehistoric community that populated the valley.
- 11.7.70 The ZTV (**Figure 11.2**) indicates that up to four wind turbine blade tips would be visible from **SM2492**, with the photomontage (**Figure 11.7h**) confirming that four wind turbines would be visible, inclusive of three hubs. The closest turbine would be T1, situated approximately 1.5km south east of the asset. T2, T3, and T4 would be located to the south east of the asset.
- 11.7.71 The wind turbines would not be visible in direct views towards the asset from the immediate approach and would not backdrop the cairn. However, they would be peripheral in views when approaching the asset from the north or south along the Endrick Water Valley, and would be prominent enough to cause some distraction when approaching. As such, the ability to understand, appreciate and experience the asset's placement along the base of the Endrick Water Valley would be marginally impacted.
- 11.7.72 Key views out from the cairn are primarily to the south, towards the open landscape of the Carron Valley and the Campsie Fells. The proposed wind turbines would not feature in this view (**Figure 11.7c**), and would not impact the ability to understand, appreciate, and experience the intentional placement of the asset to overlook the valley. Any relationship between the asset and the valley would remain intact.
- 11.7.73 Any views towards the other cairn within the valley, **SM4491**, would remain intact, however, the turbines would be present in views from **SM4491** towards the asset (**Figure 11.6h**). The wind turbines are offset from the asset, and do not appear directly behind it in views from **SM4491**. They have the potential to draw the eye further north and away from the valley floor, forming a minor distraction to the ability to understand, appreciate and experience the relationship between the funerary assets.
- 11.7.74 The ability to understand the relationship between the cairn and the areas of prehistoric settlement remain intact, with the wind turbines being outwith key views. Views towards the asset from the areas of prehistoric settlement that are further south (e.g., **SLR34, SLR15**) are likely to have the proposed development in the periphery, however, the turbines would not backdrop the cairn. These wind turbines, and the dynamic movement of their turbine blades, would form a minor distraction at most from being able to understand, appreciate and experience the interrelationship relationship between the prehistoric domestic assets within the same landscape.



- 11.7.75 As outlined, the ability to understand, appreciate and experience any aspects of the asset's setting would largely be retained. However, multiple aspects of the asset's setting, namely views upon the approach, views from **SM4491** towards the asset, and views from nearby areas of prehistoric settlement, would feature the Proposed Development in peripheral views and cause a distraction. As such, the ability to understand, appreciate and experience the setting of the asset is eroded to a clearly discernible extent. However, views out towards Carron Valley to the south, views towards **SM4491** from the asset, views along the Endrick Water valley and views towards the prehistoric settlement within the valley would remain unimpacted.
- 11.7.76 On balance, it is considered that the Proposed Development would have an overall Medium Adverse magnitude of change. On an asset of High significance, this would result in a **Moderate** significance of effect. This is considered **significant** in EIA terms, as despite the views along the valley to the south being retained, all other aspects of the setting will experience a level of distraction, albeit of varying degrees, as a result of the proposed development.

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- 11.7.77 When considering the integrity of the setting of **SM2492**, there is a clear distraction to the ability to understand, appreciate and experience the asset's setting, as a result of the introduction of the Proposed Development into the landscape. There would be a change in the approaches to the asset, views of the asset from **SM4491**, and views of the asset from nearby areas of prehistoric settlement. In all cases, the introduction of the Proposed Development within close proximity to the asset would draw the eye away from these aspects of the asset's setting. This impact would distract from our ability to understand, appreciate and experience the asset's placement within a funerary landscape, its placement along the Endrick Water valley, and its placement in proximity to areas of prehistoric settlement.
- 11.7.78 However, whilst there would be a distraction, the ability to understand, appreciate and experience the asset's placement within a funerary landscape, its placement along the Endrick Water valley, and its placement in proximity to areas of prehistoric settlement would not be removed and views would not be obstructed by the Proposed Development. These aspects of the asset's setting are key to understanding its placement and the positioning of the Proposed Development would preserve their legibility. Furthermore, views southwards over the Carron Valley and towards the Campsie Fells would remain unimpacted, with the turbines remaining outwith any views. As such, the ability to understand, appreciate and experience the asset's intentional placement with views along the valley to the south would remain intact.
- 11.7.79 On balance, the ability to understand, appreciate, and experience the aspects of the asset's setting that contribute to its significance are adequately retained. Therefore, when viewed within the context of NPF4 Policy 7 (h), the significant adverse impacts on the integrity of the setting of a scheduled monument are avoided and the integrity of setting is adequately retained.

Todholes, cairn 1300m NNW of (SM4491)

- 11.7.80 The asset comprises a double ring cairn, dated to the late Neolithic or Early Bronze Age (approximately 3500 to 4500 years ago). The cairn comprises two circular bands of stones, both measuring 2m in thickness, with the outer ring measuring 14m in diameter and the inner ring measuring 5m in diameter. The cairn holds archaeological value, with archaeological investigations having the potential to further our understanding of prehistoric burial assets and practices, as well as potentially holding information about the prehistoric population of the area.



Furthermore, the cairn itself may be overlying palaeoenvironmental remains which have the potential to further our understanding of the environment at the time of the asset's construction.

- 11.7.81 The cairn derives part of its cultural significance from its landscape setting. The asset is situated on a plateau, at approximately 300m AOD, on the eastern extent of Stronend. Located 0.4km west of Endrick Water, elevated above the valley and with extensive views along the length of the watercourse to the north and south. Cringate Hill forms the border of the valley to the north and Cairnoch Hill forms the border to the east. To the south, the open landscape of the Carron Valley is visible, with the Carron Valley reservoir notable in views. Prior to the construction of the reservoir, the River Carron would have run through the valley. Endrick Water joins the Carron Valley at its western extent and heads westwards. The Campsie Fells form the backdrop of views towards the Carron Valley.
- 11.7.82 The surrounding hills provide a feeling of enclosure in three directions when standing at the asset. The placement of the cairn above the valley, with the surrounding hills enclosing the asset from the north, east and west, frames and focusses views to the south, along Endrick Water and out towards the Carron Valley and Campsie Fells. Cairns are often found associated with watercourses, natural routeways through the landscape and overlooking landscape features, indicating that the proximity to the valley and views over the landscape are of key significance. In views towards the Carron Valley, Meikle Bin and the Campsie Fells form a prominent backdrop. When standing at the cairn, the focus of the viewer is drawn south across the Carron Valley, and as such, it is likely that this view was the key view from the asset.
- 11.7.83 The approach to the asset would have been through the Endrick Water valley, likely from the south due to the hills to the north forming harder terrain to traverse. The ridge that the asset sits upon screens the asset from view in the immediate approach, however, when the cairn was at its original height, it may have been perceivable along a long distance approach. In that case, the cairn may have acted as a way marker within the valley, potentially forming a focal point when approaching through the landscape.
- 11.7.84 The cairn overlooks a number of other prehistoric assets that sit at a lower elevation along the banks of Endrick Water. A cairn (**SM2492**) is situated 0.4km to the south east, and there are views from **SM4491** to the lower cairn. The cairns form a small funerary landscape within the valley of the Endrick Water, with views between being of importance, allowing the viewer to understand, appreciate, and experience the relationship between the cairns.
- 11.7.85 The asset also overlooks a number of hut circles and roundhouse footings (**Figure 11.1, SLR14, SLR15, SLR34, SLR16**), located to the south east along the banks of Endrick Water. A further area of prehistoric settlement is located 3.2km to the east of the asset (e.g., **SLR29, SLR31, SLR25**), along the banks of Earl's Burn. As noted, cairns are often positioned above areas of settlement and agriculture. The placement of the hut circles may have informed the cairn's placement, or vice versa. The proximity and visual connection between the cairn and the two areas of settlement have the potential to further our understanding about the intersection between prehistoric funerary and domestic practices.
- 11.7.86 The assets Statement of National Importance notes sight lines to the east and south have been preserved, stating that '*preservation of sightlines from monument is important for our understanding of its position in the landscape and for studies of prehistoric astronomy*' (*HES, 1988*). To the south, the monument retains open views towards the Carron Valley and to Meikle Bin. Whilst there are possible astronomical associations in this direction, such as potential planetary alignments and clear views



- of the Milky Way, the expansive valley draws the eye down away from the sky. This suggests that the primary intent of the focussed south facing views may have been an emphasis on the surrounding landscape rather than celestial observations.
- 11.7.87 To the east, there is a plausible relationship between the rising sun and the monument's position overlooking Cairnoch Hill. Further archaeological investigation would be required to confirm the orientation of the cairn and any deliberate astronomical alignment. However, eastward views, considering the visibility of the rising sun, may contribute to the significance of the asset to some degree.
- 11.7.88 The asset is situated within a landscape that has been relatively modernised. Earlsburn Wind Farm and Earlsburn North Wind Farm are particularly prominent in views to the north, comprising 21 visible wind turbines, and are present in views when approaching the asset from the south (**Figure 11.6e**). Despite this, they are not dominant within the landscape and do not provide more than a minor distraction to the ability to understand, appreciate and experience the asset's key approach. Furthermore, the operational Craigengelt Wind Farm (comprising eight visible wind turbines), along with Earlsburn Wind Farm are visible when looking from the cairn towards the area of prehistoric settlement along the banks of Earl's Burn. These wind turbines, particularly those from Earlsburn Wind Farm which intervene in views, form an existing distraction to the ability to understand, appreciate and experience these aspects of the asset's setting.
- 11.7.89 The ZTV (**Figure 11.2**) indicates that up to four wind turbine blade tips would be visible from the asset, with **Figure 11.6h** confirming that all four wind turbines would be visible, along with three wind turbine hubs. The closest wind turbine would be T1, located approximately 1.9km south east. T2, T3, and T4 would also be present in views to the south east.
- 11.7.90 The wind turbines would be peripheral at most in the focussed south facing views from the asset, and when approaching the asset along the banks of Endrick Water from both the north and south. Whilst the wind turbines would be large modern infrastructure introduced in relative proximity to the asset and the approach, they would not be the only turbines in the landscape. The Proposed Development would be no more than a minor distraction in views towards the cairn as the cairn is barely perceptible in the landscape at present due to its denuded nature. The Proposed Development would be no more than a minor distraction as it would not directly backdrop these views, unlike those from the Earlsburn Wind Farm and Earlsburn Extension Wind Farm (**Figure 11.6e**). The primary views over Carron Valley and towards the Campsie Fells would be unobstructed and would remain open. Along with the key approaches towards the asset, these aspects of the asset's setting would still be able to be understood, appreciated and experienced.
- 11.7.91 The wind turbines would be more prominent in views to the east, as they are placed along the slopes of Cairnoch Hill which backdrops the Endrick Water Valley. Views from **SM4491** towards the assets in the Endrick Water valley (**SM2492**, and the prehistoric settlement remains; see **Figure 11.6h**) would also include the turbines. However, due to the placement of the assets within the valley and the turbines being offset and placed on the hill above and behind them, the Endrick Water valley itself is not obstructed from view. However, as the wind turbines are still present within these views and due to the dynamic nature of the moving turbine blades, the eye may be drawn away from the lower lying landscape to some extent. As such, there would be a minor distraction in views towards the assets to the east from **SM4491** and the ability to understand, appreciate, and experience the relationship between the assets, the connection to prehistoric settlement and the funerary landscape of the Endrick Water valley would be impacted to a minor degree.



- 11.7.92 The wind turbines would be present in views to the prehistoric settlement along the banks of Earl's Water, however, they are offset from the settlement to the south and would not impact the ability to understand, appreciate and experience the interrelationship any more than the existing wind farms within the landscape have.
- 11.7.93 Whilst astronomical connections are not proven, the turbines would be most present in views towards Cairnoch Hill when looking in the direction of the sunrise from the asset. The moving blades may distract to a degree from the ability to experience the connection between the asset and the sunrise, however, the distance between the wind turbines ensures that there is enough of the skyline visible to understand and appreciate the movement of the sun over the horizon. As such, the turbines would present a moderate distraction at most to the ability to understand, appreciate and experience the potential connection between the asset and the sunrise.
- 11.7.94 As outlined, there would be impacts on the ability to understand, appreciate and experience some aspects of the asset's setting, albeit of varying degrees, comprising peripheral views upon the approach to the asset, views into the valley towards contemporary assets, and views towards Cairnoch Hill. The open views towards Carron Valley and the Campsie Fells remain completely unobstructed and the ability to understand, appreciate and experience this key aspect of the setting would not be impacted by the Proposed Development. On balance, and considering the combination of the impacts outlined above, including a minor distraction to the ability to understand and appreciate the relationship between **SM2492**, as well as the altering of views in relation to the non-designated heritage assets to the south east, it can be said that the ability to understand, appreciate and experience the setting of the asset is eroded to a clearly discernible extent.
- 11.7.95 It is considered that the Proposed Development would have an overall Medium Adverse magnitude of change. On an asset of High significance, this would result in a **Moderate** significance of effect. This is considered **significant** in EIA terms. Despite the views along the valley to the south being retained, all other aspects of the setting will experience a level of distraction, albeit of varying degrees, as a result of the Proposed Development.

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- 11.7.96 When considering the integrity of the setting of **SM4491**, there is a clear distraction to the ability to understand, appreciate, and experience the asset's setting as a result of the introduction of the Proposed Development into the landscape. The changes would be present within the approaches to the asset, views towards **SM2492**, views to areas of prehistoric settlement, and views towards Cairnoch Hill. This would impact our ability to understand, appreciate, and experience the asset's placement within a funerary landscape, its placement within the context of prehistoric settlement and society, its placement above the Endrick Water valley.
- 11.7.97 However, with regards to the majority of these aspects of the asset's setting, the wind turbines would be peripheral in most views and would not remove or obstruct the ability to understand, appreciate, or experience the contribution of these aspects of the asset's setting to its cultural significance. In addition, the key views from the asset over the Carron Valley and towards the Campsie Fells are unimpacted by the Proposed Development and would remain unobstructed. The intentional placement of the asset in the landscape is able to be understood, appreciated and experienced and the asset's setting would still be legible.
- 11.7.98 On balance, the ability to understand, appreciate, and experience the aspects of the asset's setting that contribute to its significance are adequately retained. Therefore, when considering NPF4 Policy 7 (h), the development may be supported



as significant adverse impacts on the integrity of the setting of the scheduled monument are avoided.

Dundaff Hill, mound 550m NE of summit (SM6553)

- 11.7.99 The asset comprises a man-made mound, approximately 40m in diameter and about 2m in height. The asset has a low bank around all but the east side, but this is probably later in date than the original mound construction. The mound has not been dated, but conservative estimates place the mound as neolithic to bronze age in date. The asset's significance derives in part from its intrinsic value, with the cairn holding the potential to contain funerary deposits and evidence relating to its construction. Archaeological investigation has the potential to further our understanding of prehistoric burial rituals and practices, as well as broadening our understanding of prehistoric society within the Carron Valley area.
- 11.7.100 The asset's setting also contributes to its significance. The asset is positioned on a north facing slope of Dundaff Hill, overlooking the modern Buckieburn Reservoir (**Figure 11.9c**). Prior to the construction of the reservoir, the landscape was a small valley containing grazing and agricultural land. Buckie Burn, a tributary of the River Carron, runs through the eastern extent of the valley, and Earl's Burn, also a tributary, borders the valley to the west (**Figure 11.9b**). The River Carron runs to the east and south of Dundaff Hill, with the Carron Valley acting as a key routeway through the landscape. As the cairn is placed on a north facing slope, there are limited views eastwards towards the river and Carron Valley itself, indicating that the main visual focus of the cairn was over the landscape to the north and along the burn to the west. However, the cairn may have acted as a way marker along key routes towards the larger valley.
- 11.7.101 The asset is set back from the eastern edge of the hill and as such, may not have been overly visible along the long distance approach due to screening from the topography. As such, whilst the asset would have been visible in the immediate approach from the east, long distance views of the asset from this direction would not have been important. The asset may have been visible from the lower ground to the north; however, this is no longer a point of appreciation due to the presence of the reservoir. It is more likely that the cairn would have been visible in the approach from the west, along the lower ground near Earl's Burn, however, the slope of Dundaff Hill is steeper on its western side and as such would be less likely to have been the main approach.
- 11.7.102 There is no evidence of prehistoric settlement in the valley to the north of the asset, however, the land prior to the creation of the reservoir would have been fertile and historic mapping shows that it was used for agriculture. It may be that the land was used for agriculture and settlement in the prehistoric period. The asset may have had visibility of the prehistoric settlement along the northern banks of Earl's Burn (**Figure 11.1**, e.g., **SLR32, SLR25, SLR26, SLR31, SLR18**). The asset may be overlooking 'ancestral lands' and as such, views looking up at the asset from the valley below may be of significant, with views from the asset towards these areas of settlement also having been of significance.
- 11.7.103 A designated cairn (**SM7131**) is located approximately 0.45km to the south of the asset, on the south east of Dundaff Hill. The topography of Dundaff Hill means that there is no visibility between the cairn and the asset. Whilst there is no visual connection between the assets, the spatial connection between the assets has the potential to further our understanding about the funerary practices within the wider Carron Valley area.
- 11.7.104 There are numerous non-designated burial assets, also prehistoric in date, to the north east of the asset. Ghost Knowe (**NHRE: 45953**) is a cairn recorded 1.1km to



- the north east, a potential burial mound (**NHRE: 45954**) is recorded 1.2km north east and the record of a Bronze Age beaker within a now removed burial mound (**NHRE: 45955**) is recorded 1.3km to the north east of the asset. With the asset, these burial monuments form a funerary landscape and visibility between them is likely of significance.
- 11.7.105 The landscape has been modernised somewhat since the construction of the cairn. Along with the aforementioned Buckieburn Reservoir, there are numerous operational wind farms and wind turbines within view, all to the east and north east. These comprise Craiganet, Craigengelt, Earlsburn and Earlsburn North. These operational developments form a distraction within the landscape to the north west, in approaches from the west and when overlooking any areas of prehistoric settlement from the cairn.
- 11.7.106 The ZTV (**Figure 11.2**) indicates that up to four turbines would be visible from the asset, with **Figure 11.9f** confirming that four turbines, along with their hubs would be visible. The closest wind turbine would be T4, located 3.2km to the west.
- 11.7.107 The Proposed Development would not be present in views to the north (**Figure 11.9c**), overlooking the fertile ground, the Buckieburn Reservoir or the prehistoric funerary assets. Views south towards the asset from this ground to the north would also be unimpacted by the proposed wind turbines. Upon the approach to the asset from the east, there would be very limited occasions when both the asset and the Proposed Development would both be in view. The turbines would not impact the ability to understand the asset's placement on the hill. These aspects of the asset's setting would remain unimpacted by the Proposed Development and would retain the ability to be understood, appreciated and experienced.
- 11.7.108 When approaching the asset from the west, along Earl's Burn, the proposed wind turbines would be peripheral. They would not form the backdrop to any key views and would not distract the viewer from the ability to understand, appreciate and experience the asset's placement overlooking the lower lying landscape. When viewing the location of the asset from the areas of prehistoric settlement, the pre-existing operational wind farms cause a distinct distraction within the landscape (**Figure 11.9b**). Any additional peripheral views of the proposed development would not provide any further impact than that already in place from the operational wind farms.
- 11.7.109 The only instance in which the Proposed Development may contribute to an impact on the ability to understand, appreciate and experience the asset and its setting is in outward views towards Earl's Burn and the prehistoric settlement areas, to the north west. The Proposed Development would be present in peripheral views to the west (**Figure 11.9f**) and may draw the eye away from the lower lying landscape, the burn and the areas of settlement to the north west. The Earlsburn developments and Craigengelt Wind Farm form a visually coherent scheme of turbines, with the proposed development being offset and separate. This may cause a distraction, drawing the eye away from the key aspects of the landscape, impacting the ability to understand, appreciate and experience the asset to a very minor extent.
- 11.7.110 A single aspect of the asset's setting would be impacted by the Proposed Development. It is considered that the Proposed Development would have an overall Low Adverse magnitude of change. On an asset of High significance, this would result in a **Minor** significance of effect. This is considered **not significant** in EIA terms.



Summary of Operational Effects

A summary of the anticipated operational effects of the proposed development on the assessed cultural heritage assets is outlined in **Table 11-9**.

Table 11-9: Summary of Operational Effects

Cultural Heritage Asset	Cultural Heritage Significance	Magnitude of Change	Significance of Effect	Significant in EIA Terms?
Sir John de Graham's Castle (SM4278)	High	Medium Adverse	Moderate	Yes
Waterhead, two standing stones 800m ENE of (SM2719)	High	Low Adverse	Minor	No
Todholes, cairn 1000m NNE of (SM2492)	High	Medium Adverse	Moderate	Yes
Todholes, cairn 1300m NNW of (SM4491)	High	Medium Adverse	Moderate	Yes
Dundaff Hill, mound 550m NE of summit (SM6553)	High	Low Adverse	Minor	No

11.8 Cumulative Assessment

- 11.8.1 There are no anticipated cumulative effects resulting from construction impacts from the Proposed Development. As such, the following assessment is based on the potential for cumulative effects on the setting of cultural heritage assets arising from the operational stage of the Proposed Development.
- 11.8.2 Cumulative effects have been considered with regard to any wind farm developments that are:
- Consented (but not constructed) or the subject of valid applications but currently undetermined planning or Section 36 applications; and
 - Within 15km of any nationally important assets anticipated to be subject to a Minor adverse effect (or above) as a result of the Proposed Development.

Table 11-10: Developments considered for Cumulative Assessment on Cultural Heritage Assets

Wind Farm Development	Status	Number of Turbines
Drummarnock	Application	4
Earlsburn Extension	Consented	7
Shelloch	Consented	5



Sir John de Graham's Castle (SM4278)

- 11.8.3 With regard to Sir John de Graham's Castle (**SM4278**), three developments fall within the criteria to be included for cumulative assessment. Shelloch Wind Farm, a consented development, is located approximately 2.5km to the north west of the asset and comprises five wind turbines. **Figure 11.4e** shows that up to four wind turbine blade tips from Shelloch Wind Farm would be visible from the asset, with up to three visible wind turbine hubs. Earlsburn Extension Wind Farm, a consented development, is located approximately 4.5km north of the asset and comprises seven wind turbines. **Figure 11.4e** shows that up to five wind turbine blade tips would be visible, with up to two wind turbine hubs. Drummarnock Wind Farm, a four wind turbine scheme currently with a planning application submitted and awaiting determination, is located to 5km to the north east of the asset. Whilst not visible from the asset itself, up to two wind turbine blade tips are visible from the approach to the west and from Fintry Castle (**SM7085**) (**Figure 11.5b**, **Figure 11.8b**).
- 11.8.4 These developments would be minimally present in views along the approach towards the asset from the west, and upon exiting the asset, Shelloch and Earlsburn Extension would only be present in peripheral views. They would not be present in key views over Carron Valley to the south, would not be prominent in any approaches and would not impact the ability to understand, appreciate, experience the asset's ability to command and control the valley. The relationship between contemporary assets and Sir John de Grahams Castle would remain intact.
- 11.8.5 As such, when viewed cumulatively with Shelloch Wind Farm, Earlsburn Extension Wind Farm, and Drummarnock Wind Farm, the setting of Sir John de Graham's Castle would not experience change from the Proposed Development to the point that it would increase the overall significance of effect beyond what is assessed in Section 11.7.
- 11.8.6 The magnitude of change would remain medium adverse, with would result in a **moderate** significance of effect. This is considered **significant** in EIA terms.

Todholes, cairn 1000m NNE of (SM2492)

- 11.8.7 With regard to Todholes, cairn 1000m NNE of (**SM2492**), three developments fall within the criteria for inclusion. Shelloch Wind Farm, a consented five wind turbine scheme is located approximately 1.3km to the north west. **Figure 11.7d** demonstrates that up to three wind turbine blade tips, and one wind turbine hub, would be visible from the asset. Earlsburn Extension Wind Farm is a consented seven wind turbine scheme, located approximately 3.8km north east of the asset. **Figure 11.7e** shows that up to two wind turbine blade tips would be visible from the asset. Drummarnock Wind Farm, a four wind turbine scheme currently with a planning application submitted and awaiting determination, is located approximately 5km north east of the asset. **Figure 11.7b** shows that up to one wind turbine blade tip would be visible from the asset.
- 11.8.8 Due to the minimal visibility of Earlsburn Extension Wind Farm and Drummarnock Wind Farms, they would not be anticipated to introduce any perceivable change into the setting of **SM2492**.
- 11.8.9 Shelloch Wind Farm would introduce wind turbines in views from the asset towards **SM4491**, a roughly contemporaneous cairn located on a higher part of the landscape. The Shelloch Wind Farm wind turbines would not impede visibility towards the asset, and would not directly backdrop the asset in these views, but would form a minor distraction to the ability to understand, appreciate and experience the connection between the assets and the funerary landscape of the Endrick Water valley. Therefore, the connection between **SM4292** and **SM4491** would be still legible, with reciprocal views preserved.



- 11.8.10 Whilst Shelloch Wind Farm alone would not be anticipated to produce a significant impact on the ability to understand, appreciate and experience the setting of **SM2492**, the addition of the Proposed Development in views to the east would mean that the viewer would have views of wind turbines in three directions, due to the present operational wind farms to the north (Earlsburn and Earlsburn North). The only completely open view would be the primary view along Endrick Water and over the open landscape of Carron Valley to the south. Despite this, Shelloch Wind Farm would not encompass the full view to the west, and the wind turbines would not encroach into the periphery of any views to the south. The wind turbines would be part of a wider landscape of already constructed wind farms, which have resulted in contributing a higher degree of change the setting of the asset.
- 11.8.11 As such, when viewed cumulatively with Shelloch Wind Farm, Earlsburn Extension Wind Farm, and Drummarnock Wind Farm, the setting of **SM2492** would not experience change from the Proposed Development to the point that it would increase the overall significance of effect beyond what is assessed in Section 11.7. Due to this, the magnitude of change would remain as being medium adverse, which would result in a moderate significance of effect. This is considered **significant** in EIA terms. However, as set out more fully at Section 11.7.75 due to contributing factors of the asset setting the significant adverse impacts on the integrity of the setting of a scheduled monument are avoided and as such can be supported in terms of NPF4 Policy 7 (h).

Todholes, cairn 1300m NNW of (SM4491)

- 11.8.12 With regard to Todholes, cairn 1300m NNW of (**SM4491**), three developments fall within the criteria for inclusion. Shelloch Wind Farm, a consented five wind turbine scheme, is located approximately 0.9km to the north west of the asset. **Figure 11.6d** indicates that up to three wind turbine blade tips would be visible from the asset. Earlsburn Extension is a consented seven wind turbine scheme, located approximately 3.6km to the north east of the asset. **Figure 11.6e** demonstrates that up to one wind turbine blade tip would be visible from the asset. Drummarnock Wind Farm, currently with a planning application submitted and awaiting determination, is a four wind turbine scheme located approximately 5.2km east of the asset. **Figure 11.6b** shows that up to one wind turbine blade tip would be visible from the asset.
- 11.8.13 Earlsburn Extension and Drummarnock wind farms, would be minimally visible from the asset and would have a negligible impact on any aspects of its setting. Shelloch Wind Farm would be present in reciprocal views towards **SM4491** from **SM2492**, within the Endrick Water Valley. However, in all other key views Shelloch Wind Farm would not be present. As such Shelloch Wind Farm would have no more than a minor impact on the setting of **SM4491**.
- 11.8.14 As such, when viewed cumulatively with Shelloch Wind Farm, Earlsburn Extension Wind Farm, and Drummarnock Wind Farm, the setting of **SM4491** would not experience change from the Proposed Development to the point that it would increase the overall significance of effect beyond what is assessed in Section 11.7. As such the magnitude of change would remain medium adverse, which would result in a **moderate** significance of effect. This is considered **significant** in EIA terms. However, as set out in Section 11.7.96 considering NPF4 Policy 7 (h), the development may be supported as significant adverse impacts on the integrity of the setting of a schedule monument are avoided due to the wind turbines being peripheral from the majority of the aspects at the asset and the key views being unimpacted.



Dundaff Hill, mound 550m NE of summit (SM6553)

- 11.8.15 With regard to Dundaff Hill, mound 550m NE of summit (**SM6553**), three developments fall within the criteria for inclusion. Shelloch Wind Farm, a consented five wind turbine scheme is located approximately 7.7km north west of the asset. **Figure 11.9b** indicates that up to five wind turbines would be visible from the asset. Earlsburn Extension Wind Farm is a consented seven wind turbine scheme, located approximately 5.7km north west of the asset. **Figures 11.9b** and **11.9c** show that up to seven wind turbines would be visible. Drummarnock Wind Farm, currently with a planning application submitted and awaiting determination, is a four turbine scheme located 2.2km to the north west of the asset. **Figure 11.9c** demonstrates that all four wind turbines would be visible from the asset.
- 11.8.16 Currently, the operational Earlsburn Wind Farm, Earlsburn Extension Wind Farm, Craigannet, and Craigengelt Wind Farm are visible from the asset. When viewed from **SM6553**, Shelloch Wind Farm, Earlsburn Extension Wind Farm, and Drummarnock Wind Farm will appear visually combined with these operational schemes, widening the spread of wind turbines. It is anticipated that these developments, particularly the prominent wind turbines from Drummarnock Wind Farm, would cause a minor distraction when approaching from the east and in views over the landscape to the north west, towards the areas of prehistoric settlement along Earl's Burn. Despite this distraction, the ability to understand, appreciate and experience the connection between the funerary monument and the land where the prehistoric population were living and working is still preserved.
- 11.8.17 As outlined in Section 11.7, the Proposed Development would only cause an impact to one aspect of the asset's setting, a slight distraction to the ability to understand, appreciate and experience views over the prehistoric settlement to the north west. When viewed cumulatively with the developments outlined above, the proposed development would not further increase the impact on the setting to the asset. The Proposed Development would further widen the spread of wind turbines to the north west of the asset, but the distraction would not be enough to increase the impact on the asset's setting. With reference **Table 11.4**, it is considered that the ability to understand, appreciate, and experience the asset's setting would be eroded to a minor extent.
- 11.8.18 As such, it is considered that the setting of **SM6553** would not experience change from the Proposed Development to the point that it would increase the overall significance of effect beyond what is assessed in Section 11.7.
- 11.8.19 The magnitude of change would remain low adverse, with would result in a **minor** significance of effect. This is considered **not significant** in EIA terms.

Waterhead, two standing stones 800m ENE of (SM2719)

- 11.8.20 With regard to Waterhead, two standing stones 800m ENE of (SM2719), there are two developments that fall within the criteria for inclusion. Earlsburn Extension Wind Farm, a consented seven wind turbine scheme, is located approximately 7.5km north east of the asset. **Figure 11.10b** indicates that up to seven wind turbines would be visible from the asset. Drummarnock Wind Farm is a four turbine scheme, currently with a planning application submitted and awaiting determination, located approximately 7.8km north east of the asset. **Figure 11.10b** indicates that one wind turbine blade tip would be present in views from the asset.
- 11.8.21 These schemes would be visible in views along one aspect of the asset's setting, in views to the north east along the River Carron and over the Carron Valley, which are backdropped by Cairnoch Hill. These views form part of our understanding of the placement of the asset above fertile land, the asset's association with



watercourses and the asset's potential placement as a way marker along a key route in the landscape. Drummarnock Wind Farm would be minimally visible, with Earlsburn Extension Wind Farm appearing to form part of the scheme of operational developments that already exist in views to the north east. Whilst visible, both developments would not be anticipated to impact the ability to understand, appreciate and experience the asset's setting.

- 11.8.22 As such, when viewed cumulatively with Earlsburn Extension Wind Farm and Drummarnock Wind Farm, the setting of **SM2719** would not experience change from the Proposed Development to the point that it would increase the overall significance of effect beyond what is assessed in Section 11.7.
- 11.8.23 The magnitude of change would remain low adverse, with would result in a **minor** significance of effect. This is considered **not significant** in EIA terms.

11.9 Additional Mitigation and Enhancement

- 11.9.1 Where direct impacts on heritage assets have not been able to be avoided by design, mitigation is suggested. These suggestions are in line with NPF4 Policy 7o and Policy 12(b) of the Stirling Local Development Plan (Stirling Council, 2018), being developments will be permitted if they are of a scale, layout and nature such that adverse environmental impacts, including cumulative impacts, are avoided or minimised to the satisfaction of the planning authority.
- 11.9.2 With reference to the identified construction impacts highlighted in **Table 11-7**, **Table 11-11** outlines the proposed mitigation for the assets that have potential for direct impacts as a result of the construction phase of the Proposed Development. All proposed mitigation would be subject to approval by Stirling Council and their archaeological advisor and would be proportionate to the level and nature of impact.

Table 11-11: Additional (Secondary) Mitigation for Construction Impacts

Asset	Infrastructure	Mitigation/ Enhancement Measure
Remains of farmstead (SLR60)	Track	Demarcation of asset if avoidance is possible. If avoidance of asset is not possible an archaeological watching brief is recommended during construction works within a 5m buffer of the asset. This will include archaeological recording of above-ground remains prior to construction, comprising photographs, measurements, and detailed notes.
Remains of enclosure (SLR61)	Track	Demarcation of asset if avoidance is possible. If avoidance of asset is not possible an archaeological watching brief is recommended during construction works within a 5m buffer of the asset. This will include archaeological recording of above-ground remains prior to construction, comprising photographs, measurements, and detailed notes.
Rubble stone wall (SLR106)	Hardstanding of T2 and Track	The asset is of negligible significance and impacts, if any, will be minimal in relation to the length of the wall and the amount of fabric that would be retained. No mitigation is therefore recommended.
Rubble stone wall (SLR107)	Track	The asset is of negligible significance and impacts, if any, will be minimal in relation to the length of the wall and the amount of fabric that would be retained. No mitigation is therefore recommended.
Unknown remains of all periods	Primary site infrastructure (forested area)	Site procedure toolbox talk/programme of awareness. Working Protocol should unrecorded features be discovered.



11.10 Residual Effects

Construction

- 11.10.1 A summary of the residual effects of the Proposed Development, following implementation of the mitigation measures detailed above (**Table 11-11**) is presented in **Table 11-12** below.
- 11.10.2 Adverse direct impacts on archaeological remains would be offset to some degree by the positive effect that archaeological recording would have in respect to our understanding of the archaeological record, which will be of wider benefit to the archaeological and local community. Whilst the proposed mitigation would be a benefit of the Proposed Development, it would not offset the impact caused by the removal of assets due to proposed construction works. As such, after the implementation of the proposed mitigation, the residual effect upon the impacted assets would remain the same.
- 11.10.3 As noted previously, all mitigation would be agreed with Stirling Council and their Archaeology Advisor.

Operation

- 11.10.4 There is no proposed mitigation to reduce the operational impacts identified in Section 11.7. As such, the residual effects upon the assets outlined in **Table 11-9** remains the same. Residual Operational Impacts are outlined in **Table 11-12**.

11.11 Summary and Statement of Significance

- 11.11.1 **Table 11-12** provides a summary of the likely effects resulting from the Proposed Development.
- 11.11.2 This assessment has considered data from a diverse range of sources in order to determine the presence of heritage assets which may be affected by the Proposed Development. The potential direct, indirect, settings, and cumulative effects of the Proposed Development on the identified assets, mitigation measures for protecting known assets during construction or recording of currently unknown features which could be lost due to groundworks during construction, and the residual effects of the Proposed Development have also been assessed.
- 11.11.3 There are four non-designated heritage assets located within the Site boundary that have the potential for direct (physical) impacts as a result of the proposed development. These comprise **SLR60, SLR61, SLR106, SLR107**, all heritage assets of negligible significance. The significance of effect on these assets as a result of direct impacts is anticipated to be negligible, which is not significant in EIA terms. There is the potential for unknown remains of all periods within the site, however, due to the commercial forestry likely removing any archaeological context any unrecorded remains within areas of construction would be of negligible significance. At most the significance of effect on these assets would be minor, which is not significant in EIA terms. Where relevant, a programme of mitigation, primarily comprising demarcation and archaeological recording of assets prior to construction works, has been proposed for all assets at risk of direct physical impacts.
- 11.11.4 Five assets were assessed for impacts on their setting as a result of the Proposed Development. Impacts on the setting of Waterhead, two standing stones 800m ENE of (**SM2719**) and Dundaff Hill, mound 550m NE of summit (**SM6553**) were assessed as minor, which is not significant in EIA terms.



- 11.11.5 Impacts on the setting of Sir John de Graham's Castle (**SM4278**), Todholes, cairn 1000m NNE of (**SM2492**), and Todholes, cairn 1300m NNW of (**SM4491**) were assessed as moderate, which is considered **significant** in EIA terms. For the reasons set out above at Section 11.7 the significant adverse impacts on the integrity of the setting of a scheduled monument are avoided to allow for the proposal to be supported in terms of NPF4 Policy 7h(ii).
- 11.11.6 When considered cumulatively with the surrounding relevant developments, the cumulative impact of the Proposed Development, all heritage assets considered would remain as assessed in Section 11.7, with no additional impacts found.
- 11.11.7 Overall, the Proposed Development would be compliant with relevant policy and guidance, including NPF4 Policy 7(h), HEPS, Policy 7 and 12 of the Stirling Local Development Plan (2018).



Table 11-12: Summary of Effects

Description of Effect	Mitigation/Enhancement Measure(s)	Significance of Residual Effect	
		Level and Significance	Beneficial / Adverse
During Construction & Decommissioning			
Remains of farmstead (SLR60)	Demarcation of asset if avoidance is possible. If avoidance of asset is not possible an archaeological watching brief is recommended during construction works within a 5m buffer of the asset. This will include archaeological recording of above-ground remains prior to construction, comprising photographs, measurements, and detailed notes.	Negligible (Not Significant)	Adverse
Remains of enclosure (SLR61)	Demarcation of asset if avoidance is possible. If avoidance of asset is not possible an archaeological watching brief is recommended during construction works within a 5m buffer of the asset. This will include archaeological recording of above-ground remains prior to construction, comprising photographs, measurements, and detailed notes.	Negligible (Not Significant)	Adverse
Rubble stone wall (SLR106)	The asset is of negligible significance and impacts, if any, will be minimal in relation to the length of the wall and the amount of fabric that would be retained. No mitigation is therefore recommended.	Negligible (Not Significant)	Adverse
Rubble stone wall (SLR107)	The asset is of negligible significance and impacts, if any, will be minimal in relation to the length of the wall and the amount of fabric that would be retained. No mitigation is therefore recommended.	Negligible (Not Significant)	Adverse
Unknown remains of all periods	Site procedure toolbox talk/programme of awareness. Working Protocol should unrecorded features be discovered.	Very Minor (Not Significant)	Adverse
During Operation			
Sir John de Graham's Castle (SM4278)	N/A	Moderate (Significant)	Adverse
Waterhead, two standing stones 800m ENE of (SM2719)	N/A	Minor (Not Significant)	Adverse



Description of Effect	Mitigation/Enhancement Measure(s)	Significance of Residual Effect	
		Level and Significance	Beneficial / Adverse
Todholes, cairn 1000m NNE of (SM2492)	N/A	Moderate (Significant)	Adverse
Todholes, cairn 1300m NNW of (SM4491)	N/A	Moderate (Significant)	Adverse
Dundaff Hill, mound 550m NE of summit (SM6553)	N/A	Minor (Not Significant)	Adverse
Cumulative Effects			
Sir John de Graham's Castle (SM4278)	N/A	Moderate (Significant)	Adverse
Waterhead, two standing stones 800m ENE of (SM2719)	N/A	Minor (Not Significant)	Adverse
Todholes, cairn 1300m NNW of (SM4491)	N/A	Moderate (Significant)	Adverse
Todholes, cairn 1000m NNE of (SM2492)	N/A	Moderate (Significant)	Adverse
Dundaff Hill, mound 550m NE of summit (SM6553)	N/A	Minor (Not Significant)	Adverse



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11.13 Abbreviations List

Abbreviation	Meaning
ALGAO	Association of Local Government Archaeological Officers
EIA	Environmental Impact Assessment
GDL	Garden and Designed Landscape
HEPS	Historic Environment Policy for Scotland
HER	Historic Environment Record
HES	Historic Environment Scotland
HLA	Historic Land-Use Assessment
NCAP	National Collection of Aerial Photography
OS	Ordnance Survey
SHEA	Scotland's Historic Environment Audit
WSI	Written Scheme of Investigation
ZTV	Zone of Theoretical Visibility



Making Sustainability Happen



Chapter 12: Traffic and Transport

Environmental Impact Assessment Report

Cairnoch Hill Wind Farm

3 August 2026



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Figure 12.1: Study Area and Traffic Counts

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12.0 Traffic and Transport

12.1 Introduction

- 12.1.1 This chapter of the Environmental Impact Assessment (EIA) Report presents an assessment of the potential effects on users of the transport network resulting from additional vehicle movements that could arise from the construction, operation and decommissioning of the proposed Cairnoch Hill Wind Farm (“the Proposed Development”).
- 12.1.2 The assessment has been undertaken in accordance with relevant policy, legislation and standard guidance. The main guidance document used in the assessment has been the Institute of Sustainability and Environmental Professionals (ISEP¹) ‘Guidelines: Environmental Assessment of Traffic and Movement’. This document provides “*practitioners with good practice advice on how to carry out the assessment of traffic and movement of people as part of a statutory EIA or non-statutory environmental assessment*”.
- 12.1.3 This chapter:
- Summarises the consultation responses that informed the assessment;
 - Describes the assessment method used;
 - Describes current and future baseline conditions (i.e. the current conditions and the future conditions in the absence of the Proposed Development);
 - Describes measures that would be embedded in the design of the Proposed Development to minimise transport-related effects;
 - Presents estimates of the additional vehicle movements expected to arise from the Proposed Development and assesses the impacts and effects of those movements, considering both the Proposed Development individually and in combination with other nearby developments;
 - Identifies any additional measures that would be required to mitigate any transport-related effects arising from the Proposed Development; and
 - Describes any residual effects after the implementation of any additional mitigation measures.
- 12.1.4 An appraisal of the Proposed Development’s compliance with relevant policy is given in the separate **Planning Statement** provided as part of the suite of documents forming the planning application.
- 12.1.5 The chapter is accompanied by **Technical Appendix 12.1: Turbine Delivery Route Feasibility Assessment**, which is a report that considers the feasibility of delivering the wind turbine components to the location of the Proposed Development (“the Site”).

12.2 Consultation

- 12.2.1 Consultation undertaken prior to and during the EIA Scoping stage was described in the Cairnoch Hill EIA Scoping Report. Relevant consultee responses included in

¹ Formerly The Institute of Environmental Management and Assessment (IEMA)



the Scoping Opinion, and post-Scoping consultation relevant to this assessment are summarised in **Table 12-1**.

Table 12-1: Summary of Consultation

Consultation Details	Consultee Comments	Applicant Response
Stirling Council Transport Team		
Scoping Opinion	<i>“Q12.1: Confirmation of agreement with regards the scope of the proposed assessment, including those elements proposed to be scoped out? I can confirm that Stirling Councils Transport Development Team are content with the scope of the proposed assessment.”</i>	The assessment has been undertaken based on the suggested scope
	<i>“Q12.2: Confirmation that traffic survey as discussed above would be appropriate? Agreed”</i>	Traffic surveys have been undertaken as described in paragraph 12.3.13 .
	<i>“Q12.3: Confirmation that the use of DfT data for obtaining traffic flow data on the A872, A904 and M9 is acceptable? These roads fall outwith Stirling Council’s adopted road network and would therefore be for others to comment on (Transport Scotland and Falkirk Council).”</i>	No Department for Transport (DfT) traffic data has been used. Traffic surveys have been undertaken as described in paragraph 12.3.13 .
	<i>“Q12.4: Confirmation of any committed developments to be taken into account within the cumulative assessment? Durieshill and South Stirling Gateway development sites both benefit from having received planning approval. South Stirling Gateway is currently under construction and it is anticipated that Durieshill will commence next year (2025). Both of these developments will have an impact on the Pirnhall Interchange (Junction 9).”</i>	The Study Area (described in paragraph 12.3.10) does not extend to the Pirnhall Interchange.
	<i>“In addition to the above, the impact on any core path and/or Rights of Way in the vicinity of the development site should be assessed and mitigated where required. It may be that an Access Management Plan will be a requirement of our service. An outline / framework for the Access Management Plan should be submitted as part of any future application, and should consider the requirements set out in the Scottish Natural Heritage (now known as NatureScot) guidance document ‘A Brief Guide to Preparing an Outdoor Access Plan’ (2010). Consideration should be given to the impacts of the construction, operational, and decommissioning phases of the development upon any core paths/Rights of Way.”</i>	These items are addressed in Technical Appendix 15.2: Outline Access Management Plan .
	<i>“Finally, you may be aware that the Transport Development Team has provided comments on similar proposals over recent years, and it is worth highlighting at this stage the following points, which have been previously raised, and which we may look</i>	Submission of a Construction Traffic Management Plan (CTMP) could be made a condition of any consent.



Consultation Details	Consultee Comments	Applicant Response
	<i>to be captured through planning controls (conditions / Section 75):</i> <i>The implementation of a Traffic Management Plan. This may include the requirement for temporary speed limits along the route where construction traffic (including abnormal vehicles) will travel through settlements, or sections of the public road where assessment shows constraints on the road.</i>	
	<i>The implementation of mitigation works to accommodate abnormal vehicle loads, and construction traffic volumes (road widening, passing places etc) supported by a vehicle route assessment survey (to include abnormal load routing).</i>	Mitigation works to accommodate Abnormal Indivisible Load Vehicles (AILVs) delivering the turbine components are identified in Technical Appendix 12.1 .
	<i>A road condition survey, to be undertaken prior to the implementation of works, with an agreement made for the monitoring of deterioration of the public road, and its subsequent repair, as a result of vehicles associated with the development.</i>	This could be stipulated in a condition attached to any consent granted for the Proposed Development.
	<i>Further assessment, where specific vehicle information is not yet known, in order to provide the required level of assessment prior to works commencing (e.g. further swept path analysis, detailed route assessment"</i>	These matters could be stipulated in a condition attached to any consent granted for the Proposed Development.
The British Horse Society Scotland		
Scoping Opinion	<i>A road safety audit of proposed mitigation works along the public roads.</i>	Appropriate advice would be included in the CTMP

12.3 Assessment Methodology and Significance Criteria

Proposed Development

- 12.3.1 The Proposed Development would generate demand for transport during its construction and this demand would have the potential to impact users of the transport network and potentially have an effect on those users. Transport demand would be generated during construction by staff travelling to and from the Site - and plant, components, materials and supplies being delivered to or being removed from the Site. This transport demand would lead to additional movements of cars, vans, Light Goods Vehicles (LGVs) and Heavy Goods Vehicles (HGVs) on the road network and the effects of these movements are considered in the assessment.
- 12.3.2 The delivery of the wind turbine components during construction would require Abnormal Indivisible Load Vehicle (AILV) movements as some of the vehicles carrying the components would have at least one dimension that exceeds the maxima in The Road Vehicles (Construction and Use) Regulations 1986. The report in **Technical Appendix 12.1** reviewed the feasibility of delivering the wind turbine components to the Site and the effects of these movements are considered in this assessment.
- 12.3.3 As described in **Chapter 3: Description of the Development**, the Proposed Development includes one borrow pit, which could provide stone for use in



construction. Any stone won from this borrow pit would reduce the amount of stone that has to be imported by road from off-site quarries. The assessment in this chapter, however, assumes that no stone would be won from the onsite borrow pit and all required stone would be imported by road from existing quarries and hence represents a 'worst case' assessment.

- 12.3.4 The Proposed Development would generate only the occasional maintenance or inspection vehicle movements once operational and these would be expected to cause no significant traffic and transport-related effects. The assessment of potential effects during operation has therefore been scoped out of the assessment.
- 12.3.5 The operational period of the Proposed Development is intended to be 40 years after which it would be decommissioned unless consent was granted to extend the operational period or to repower the Proposed Development. Decommissioning of the Proposed Development is likely to generate fewer vehicle movements than construction as some elements of the Proposed Development may remain in place after decommissioning.
- 12.3.6 Decommissioning would take place too far into the future for any meaningful assessment to be made at the time of writing (baseline traffic flows, for example, would be hard to predict that far into the future). The transport impacts during decommissioning have therefore been scoped out of this assessment.

Study Area

- 12.3.7 The Study Area has been defined by using professional judgement to identify the sections of the road network likely to be used by construction-related vehicles travelling to and from the Site. The exact routes that such vehicles would take would not be known until nearer to construction starting once agreements had been reached with suppliers.
- 12.3.8 As described in **Chapter 3: Description of the Development**, the Site would be accessed from an upgraded existing access on the B818. However, there is an 18-tonne weight restriction on the B818 where it crosses Endrick Water around 8km to the west of the Proposed Development.
- 12.3.9 It would be reasonable, therefore, to assume that construction-related vehicles would use the section of the B818 east of the Site and avoid the section of the B818 to the west. The section to the east meets the A872 in Denny and vehicles would use that road as part of their route to and from Junction 9 of the M9 to the north; Junction 1 of the M876 to the south east; and Junction 7 of the M80 to the south west.
- 12.3.10 These routes form the Study Area, which is shown on **Figure 12.1** and which comprises:
 - The B818 between the Proposed Development and the A872;
 - The A872 between the B818 and Stirling Street in Denny;
 - The A872 Stirling Street in Denny; and
 - The A872 between the B818 and the Denny Eastern Access Road ("DEAR").
- 12.3.11 The report in **Technical Appendix 12.1** considers the feasibility of delivering the wind turbine components to the Site. It considers a wider area than that shown on **Figure 12.1** and identifies the following route for the delivery of the wind turbine components (shown on **Figure 12.2**):
 - Leave Grangemouth Docks on Earls Road;



- Join the M9 northbound at Junction 6;
- Leave the M9 at Junction 9 onto the A872 southbound;
- Turn right from the A872 to the B818; and
- Enter the Proposed Development from the B818.

Desk Study

- 12.3.12 Online mapping was consulted to understand the general nature of the roads within the Study Area. Data on accidents on these roads was collated from the Department for Transport's (DfT) Mapping Application for Visualising Road Injury Casualties ("MAVRIC") website².

Field Surveys

- 12.3.13 Automatic Traffic Counters (ATCs) were installed at the following locations in the Study Area (shown on **Figure 12.1**):
- The B818 in the vicinity of the access to the Site;
 - The B818 in the vicinity of Old Mill Way in Stoneywood;
 - The A872 in the vicinity of West Boreland Road between the B818 and Stirling Street in Denny;
 - The A872 Stirling Street in the vicinity of Thistle Avenue in Denny; and
 - The A872 in the vicinity of Woodland Way between the B818 and the DEAR.
- 12.3.14 These ATCs counted and classified vehicles for a week from Friday 29 August 2025.
- 12.3.15 The roads in the Study Area were visited by a member of the project team. This visit reviewed the surrounding roads, noting matters such as their configuration, presence of footways, speed limits, any restrictions on the passage of vehicles, and the presence and nature of any sensitive receptors.

Assessment of Potential Effect Level and Significance

Overview

- 12.3.16 The potential effects on traffic and the transport network have been assessed following the ISEP Guidelines referred to in paragraph 12.1.2. This involves initially establishing a 'baseline', which provides the characteristics of the existing transport network in the Study Area, including the existing number of vehicle movements on the roads therein.
- 12.3.17 Should the Proposed Development receive consent, construction is estimated to commence in late 2029. The existing vehicle movements have been factored to represent estimated 2029 vehicle movements that could be expected to occur in the absence of the Proposed Development (referred to as the 'future baseline').
- 12.3.18 The number of typical daily vehicle movements that would be generated during each month of construction have been estimated. These estimates are based on

² MAVRIC website available at
<https://dft.maps.arcgis.com/apps/dashboards/ea3b071df62a434aa21ed80a6214d690>



- volumes of materials to be transported to the site informed by the design and professional judgement based on experience of other similar projects.
- 12.3.19 Judgement has also been used to estimate the routes that these vehicles would take to and from the Site. This judgment has been informed by a review of where potential suppliers (such as those of stone and concrete) are located locally and where there are centres of population from where other supplies and staff may originate.
- 12.3.20 The number of staff likely to be present at the Site during each working day in each month of construction has been estimated based on professional judgement and experience and understanding of other similar projects.
- 12.3.21 The additional vehicle movements that could be expected to be generated during construction (based on all the required stone needing to be imported, as per paragraph 12.3.3) have been compared to the future baseline vehicle movements. The percentage increase in total vehicle movements (and in HGV movements only) arising from those additional vehicle movements compared to the future baseline has been calculated for each section of road within the Study Area. These percentage increases have been reviewed against the ISEP Guidelines, which state:
- “Following the determination of a study area, it is recommended that the competent traffic and movement expert applies two broad rules of thumb as criteria to assist in delimiting the scale and extent of the environmental assessment:*
- Rule 1 Include highway links where traffic flows will increase by more than 30% (or the number of heavy goods vehicles will increase by more than 30%)*
- Rule 2 Include highway links of high sensitivity where traffic flows have increased by 10% or more”*
- 12.3.22 Construction working hours would be expected to be 07:00 to 19:00 Monday to Friday and 07:00 to 16:00 on Saturdays. However, for the purposes of this assessment, all the construction-related vehicle movements have been concentrated into the period 07:00 to 19:00 Monday to Friday, which ensures a robust assessment against the above two rules as the percentage increases in vehicle movements are higher than if the estimates were spread over a longer period. Furthermore, not all suppliers of materials would necessarily be open on Saturdays (or open for the entire period 07:00 to 16:00).
- 12.3.23 The ISEP Guidelines also state “It should also be noted that the day-to-day variation of traffic on a road is frequently at least + or -10%. At a basic level, it should therefore be assumed that projected changes in traffic of less than 10% create no discernible environmental impact.”
- 12.3.24 The additional vehicle movements would have the potential to affect other road users, such as vehicle drivers and non-motorised users travelling along, crossing or otherwise interacting with the sections of road in the Study Area. These users are referred to as receptors.
- 12.3.25 All sections of road within the Study Area have been assessed against Rule 1. All sections of road have also been reviewed to identify if any could be considered as being of ‘high sensitivity’ and should be subject to an additional assessment against Rule 2. This review was informed by the ISEP Guidelines which state that the *“following list identifies special interests that should be considered when defining sensitive receptor geographic locations:*
- *people at home*
 - *people at work*



- *sensitive and/or vulnerable groups (including young age, older age, income, health status, social disadvantage and access and geographic factors)*
- *locations with concentrations of vulnerable users (e.g. hospitals, places of worship, schools)*
- *retail areas*
- *recreational areas*
- *tourist attractions*
- *collision clusters and routes with road safety concerns*
- *junctions and highway links at (or over) capacity*

12.3.26 Where the estimated increase in vehicle movements does not breach the relevant threshold for any section of road, the significance of any effects has been considered to be not significant in EIA terms. No further assessment work has been undertaken on such sections.

12.3.27 Where the estimated increase in vehicle movements breaches the relevant threshold for any section of road, the potential effects have been assessed on the topics described below.

Severance

12.3.28 Severance is the perceived division that can occur within a community when it becomes separated by major transport infrastructure and the separation of people from places and other people. The ISEP Guidelines say *“Changes in traffic flow of 30%, 60% and 90% are regarded as producing 'slight', 'moderate' and 'substantial' changes in severance respectively”* and *“caution needs to be observed when applying these thresholds as very low baseline flows are unlikely to experience severance impacts even with high percentage changes in traffic.”*

Road Vehicle Driver and Passenger Delay

12.3.29 The ISEP Guidelines say “Traffic delays to non-development traffic can occur at several points on the network surrounding a development site.” Regarding the significance of effects, the guidelines say “These delays are only likely to be significant when the traffic on the network surrounding the development is already at, or close to, the capacity of the system”.

Non-Motorised User Delay

12.3.30 The ISEP Guidelines say:

“The assessment of pedestrian delay serves as a proxy for the delay that other modes of non-motorised users may experience when crossing roads.

Pedestrian delay and severance are closely related effects and can be grouped together. Changes in the volume, composition or speed of traffic may affect the ability of people to cross roads. In general, increases in traffic levels are likely to lead to greater increases in delay. Delays will also depend on the general level of pedestrian activity, visibility and general physical conditions of the development site.”

12.3.31 Regarding the significance of effects, the guidelines say *“Given the range of local factors and conditions that can influence pedestrian delay (e.g. a discrete delay may have a lesser impact in an urban environment than a rural setting), it is not considered wise to set down definitive thresholds. Instead it is recommended that*



the competent traffic and movement expert use their judgement to determine whether pedestrian delay constitutes a significant effect.”

Non-Motorised User Amenity

- 12.3.32 The ISEP Guidelines define this as *“the relative pleasantness of a journey, and is considered to be affected by traffic flow, traffic composition and pavement width/separation from traffic.”* They also say *“a tentative threshold for judging the significance of changes in pedestrian amenity would be where the traffic flow (or HGV component) is halved or doubled”* and *“Thresholds are expressed as a starting point for any assessment and typically have been derived from studies of major changes in traffic flow and therefore should be used cautiously in any assessment. The assessment of amenity should pay full regard to specific local conditions.”*

Fear and Intimidation of and by Road Users

- 12.3.33 This considers the effects that moving vehicles have on people. It considers matters such as the volume of traffic, the proportion of heavy vehicles, the speed of vehicles and the proximity of traffic to people. The ISEP Guidelines set out a means to calculate a ‘degree of hazard score’ based on the amount, composition and speed of traffic. That score is then used to identify which one of four levels of fear and intimidation is applicable. The magnitude of change is based on the degree of change in that level compared to the baseline.
- 12.3.34 The ‘degree of hazard score’ is calculated from the average hourly traffic flow over 18 hours, the total number of heavy vehicles over 18 hours and the average vehicle speeds over 18 hours. A score is awarded for each element based on the thresholds shown in **Table 12-2** and the three scores are then added to calculate a degree of hazard score. For example, a section of road with an average 18-hour traffic flow of 700 vehicles per hour, 1,500 HGVs over an 18-hour period and an average vehicle speed of 35mph would have a degree of hazard score of 40, comprising an ‘a’ value of 10, a ‘b’ value of 10 and a ‘c’ value of 20.

Table 12-2: Degree of Hazard Score

Average Traffic Flow Over 18-Hour Day – All Vehicles/Hour 2-Way (a)	Total 18-Hour Heavy Vehicle Flow (b)	Average Vehicle Speed (c)	Degree Of Hazard Score (a+b+c)
>1,800	>3,000	>40	30
1,200–1,800	2,000–3,000	30–40	20
600–1,200	1,000–2,000	20–30	10
<600	<1,000	<20	0

- 12.3.35 The degree of hazard score is equated to a level of fear and intimidation using the thresholds shown in **Table 12-3**.

Table 12-3: Level of Fear and Intimidation Thresholds

Level of Fear and Intimidation	Degree of Hazard Score (a) + (b) + (c)
Extreme	71+
Great	41–70
Moderate	21–40
Small	0–20



- 12.3.36 The degree of hazard score (and hence the level of fear and intimidation) is calculated for the future baseline and for the future baseline including the number of vehicle movements estimated to be generated during construction. The change in the level of fear and intimidation between the two calculations is used to inform the magnitude of change based on the thresholds shown in **Table 12-4**.

Table 12-4: Fear and Intimidation Magnitude of Change

Magnitude of change	Change in Step/Traffic Flows (Annual Average Daily Traffic ("AADT") from Baseline Conditions
High	Two step changes in level (for example a change from a 'small' level of fear and intimidation to 'Great' would equate to two step changes).
Medium	One step change in level, but with: >400 vehicle increase in average 18 hour average two-way all vehicle flow; and/or >500 Heavy Vehicle (HV) increase in total 18hr HV flow.
Low	One step change in level, with: <400 vehicle increase in average 18 hour average two-way all vehicle flow; and/or <500 HV increase in total 18hr HV flow.
Negligible	No change in step changes.

Hazardous / Large Loads

- 12.3.37 The Proposed Development would require ALLV movements to deliver some wind turbine components, and a report on the feasibility of delivering those components is included as **Technical Appendix 12.1**.
- 12.3.38 The number of such movements has been determined, and their potential significance considered based on the extent of works, if any, required to accommodate the vehicles, their number and the sections of road that they would use. There are, however, established procedures in place to manage such movements as described in The Road Vehicles (Authorisation of Special Types) (General) Order 2003.
- 12.3.39 A risk or catastrophe analysis as described in paragraph 3.50 of the ISEP Guidelines is not considered to be required.

Receptor Sensitivity Definitions

- 12.3.40 Definitions of receptor sensitivity have been applied to the topics listed above and are shown in **Table 12-5**.

Table 12-5: Receptor Sensitivity by Impact

Impact	Negligible	Low	Moderate	High	Very High
Severance	No presence of existing communities severed by road.	Presence of existing communities with a low level of existing severance (subjective assessment).	Presence of existing communities with a moderate level of existing severance (subjective assessment).	Presence of existing communities with a high level of existing severance (subjective assessment).	Presence of existing communities with a very high level of existing severance (subjective assessment).
Road Vehicle Driver and	Road network not	Road network occasionally experiencing	Road network commonly experiencing	Road network experiencing congestion at	Road network experiencing congestion



Impact	Negligible	Low	Moderate	High	Very High
Passenger Delay	experiencing congestion.	congestion at peak times.	congestion at peak times.	peak times and some other times.	during entire working day.
Non-Motorised User Delay	Negligible levels of non-motorised activity.	Little non-motorised activity or sufficient facilities for such users.	Some non-motorised user activity with few facilities for such users.	Substantial non-motorised user activity with few facilities for such users.	Continual non-motorised user activity with no facilities for such users.
Non-Motorised User Amenity					
Fear and Intimidation of and by Road Users					
Road User and Pedestrian Safety	Generally low to moderate if locations in question have not been identified as having a cluster of accidents. High or very high otherwise.				
Hazardous / Large Loads	No hazardous or dangerous loads on the road network.	Some hazardous or dangerous loads on the road network or road network capable of handling AILVs with minimal works or effects.	Some hazardous or dangerous loads on the road network or road network capable of handling AILVs with some works or temporary closures.	Several hazardous or dangerous loads on the road network road network requires substantial works or road closures to accommodate AILVs.	Frequent hazardous or dangerous loads on the road network road network requires substantial works or road closures to accommodate AILVs.

Magnitude of Change

12.3.41 Thresholds for the magnitude of change have been identified by reference to the ISEP Guidelines and professional judgement. These thresholds are summarised in **Table 12-6**.

Table 12-6: Thresholds for Magnitude of Change by Potential Impact

Impact	Magnitude of Change			
	Large	Medium	Small	Negligible
Severance	Change in road link traffic flow of over 90%	Change in road link traffic flow of 60% to less than 90%	Change in road link traffic flow of 30% to less than 60%	Change in road link traffic flow of less than 30%
Road Vehicle Driver and Passenger Delay	Judgement based on the individual characteristics of sections of road			Change in road link traffic flow of less than 10%.
Non-Motorised User Delay	Judgement based on the individual characteristics of sections of road			Change in road link traffic flow of less than 10%.



Impact	Magnitude of Change			
	Large	Medium	Small	Negligible
Non-Motorised User Amenities	Judgement based on the individual characteristics of sections of road. Medium or high likely if change in total traffic flows or HGV flows of more than 100%.			Change in total traffic flows or HGV flows of less than 10%.
Fear and Intimidation of and by Road Users	As per Table 12-3			
Road User and Pedestrian Safety	Judgement based on accident data. Small or negligible impact likely if section of road under consideration has not been identified by the relevant roads authority as having an atypically high accident rate.			
Hazardous / Large Loads	Judgement based on number of such movements and nature of affected road network.			

Significance of Effect

12.3.42 An effect significance matrix based on the magnitude of change and receptor sensitivity is set out in **Table 12-7**.

Table 12-7: Effect Significance Matrix based on Magnitude of Change and Receptor Sensitivity

Receptor Sensitivity	Impact Magnitude of Change			
	High	Medium	Small	Negligible
Very High	Major	Major	Moderate	Minor
High	Major	Major	Moderate	Negligible
Moderate	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

12.3.43 Effects of 'Major' significance are considered to be 'significant' in terms of The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 ("the EIA Regulations"). Effects of 'Moderate' significance are considered to be either 'significant' or 'not significant' in terms of the EIA regulations and professional judgment is used to determine the level of significance. Effects of 'Minor' or 'Negligible' significance are considered to be 'not significant' in terms of the EIA Regulations.

Committed Mitigation and Enhancement

12.3.44 Where potentially significant effects are identified, taking account of embedded (primary) and standard (tertiary) mitigation, additional mitigation measures (secondary mitigation) are described. Any such measures are presented as commitments, with information provided on how the mitigation can be secured, for example through planning conditions.

Assessment of Residual Effect Level and Significance

12.3.45 The assessment of residual effects follows the same process and criteria as the assessment of potential effects, but takes account of any committed additional (secondary) mitigation and enhancement measures.



Cumulative Assessment

- 12.3.46 The potential for cumulative effects to arise from the Proposed Development in combination with other developments has been considered using the same method as described above.

Statement of Significance

- 12.3.47 A statement of significance is provided at the end of the chapter which provides a summary of the complete assessment and reports the significance of the residual effects in compliance with the EIA Regulations.

Limitations to Assessment

- 12.3.48 As noted in paragraph 12.3.23, the number of vehicle movements on a road vary continuously. However, there is no reason to believe that the vehicle movement data collected represents atypical conditions.
- 12.3.49 The construction programme has been estimated based on experience of similar projects. The routes that construction-related vehicles would take to and from the Proposed Development would vary depending on the location of staff and of the exact suppliers chosen but reasonable estimates have been made. The construction vehicle movement estimates have been averaged over a month and there would be some daily variation in vehicle movement numbers around that average.

12.4 Baseline Conditions

Existing Baseline

- 12.4.1 The existing baseline information for the sections of road within the Study Area is summarised in **Table 12-8**.



Table 12-8: Summary of Existing Baseline

Section of Road	Length of Section (km Unless Stated)	Adjoining Land Uses	Facilities for Non-motorised Users	Road Configuration	Injury-Causing Accidents (2022 – 2024)	Rule to be Assessed Against
B818 between Proposed Development and Fankerton	10	Generally open farmland with occasional direct access to fields, farms and houses.	- No footways. - Core Path 9078CV in Stirling Council's ("SC") Core Path network (which becomes NL/2/1 in North Lanarkshire Council's (NLC) Core Path network) meets the southern side of the B818 at Spittal Bridge. - Does not form part of National Cycle Network ("NCN").	- Single carriageway subject to 60mph speed limit. but two stretches of 40mph speed limit through Carron Valley. - Passing places at some locations. 'Agreed Route' in Timber Transport Forum's Agreed Route Map for Timber Transport³ as far as boundary with Falkirk Council. Would therefore	5 May 2021 at access to Craiganet. Accident involved one cyclist and caused injuries categorised as serious. 15 May 2023 around 350m west of junction with Tak-Ma-Doon Road. Accident involved vehicle and caused injuries categorised as slight.	1

³ Available at: [Agreed Route Map for Timber Transport Forum](#). Map produced by regional timber transport groups which categorises the roads leading to forests in terms of their capacity to sustain the likely level of timber haulage as follows:

- Agreed Route: roads which can be used for timber haulage without restriction other than as regulated by the Road Traffic Act 1988.
- Consultation Road: roads which are key to timber extraction but, for a variety of reasons, are not up to Agreed Route Standard.
- Severely restricted: roads which are particularly fragile or sensitive and should only be used for timber transport under a carefully supervised management regime agreed with the Local authority.
- Excluded route: roads which should not be used for timber transport in their present condition.



Section of Road	Length of Section (km Unless Stated)	Adjoining Land Uses	Facilities for Non-motorised Users	Road Configuration	Injury-Causing Accidents (2022 – 2024)	Rule to be Assessed Against
				be reasonable to expect a degree of existing HGV usage.		
B818 between Fankerton and A872	1.7	Mainly houses but also fronted by Strathcarron Hospice and some open farmland.	- Footways on each side of road through Fankerton and Stoneywood. - Footway on only southern side of road between Fankerton and Stoneywood. - Core Path 012/278 in Falkirk Council's Core Path network meets the B818 on the northern side of Fankerton. - Core Path 012/318 meets southern side of B818 at western side of Stoneywood. - Core Path 012/370 meets northern side of	- Single carriageway with one lane in each direction. - Subject to 20mph speed limit through Stoneywood and Fankerton and 30mph limit elsewhere.	1 April 2023 at junction with Redwood Drive and Kirkland Drive. Involved one vehicle and caused injuries categorised as serious. 15 December 2021 at junction with A872. Involved one vehicle and one pedestrian and caused injuries categorised as slight.	2



Section of Road	Length of Section (km Unless Stated)	Adjoining Land Uses	Facilities for Non-motorised Users	Road Configuration	Injury-Causing Accidents (2022 – 2024)	Rule to be Assessed Against
			B818 in Stoneywood. Does not form part of NCN.			
A872 between B818 and Stirling Street	500m	Fronted mainly by houses although most are set-back from the road and none have no direct vehicle or pedestrian access.	- Footways on each side of road. - Underpass between Duke Street and B818. - Pedestrian island on approach to Stirling Street junction to allow pedestrians to cross one lane at a time. - Does not form part of NCN.	- Single carriageway with one lane in each direction and turning lanes at some junctions. - Subject to 30mph speed limit.	None	2
A872 Stirling Street in Denny	1.3	Fronted by a mix of houses, commercial developments and open space.	- Footways on both sides of road. - Signalised pedestrian crossing of all three arms of junction of A872 Stirling Street and Barnego Road.	- Single carriageway with one lane in each direction and turning lanes at some junctions. - Subject to 30mph speed limit for most of its length and 40mph speed limit for	30 January 2023 around 50m north of junction with Milton Row. Involved two vehicles and caused three casualties with injuries categorised as slight.	2



Section of Road	Length of Section (km Unless Stated)	Adjoining Land Uses	Facilities for Non-motorised Users	Road Configuration	Injury-Causing Accidents (2022 – 2024)	Rule to be Assessed Against
			- Occasional traffic islands to aid pedestrians. - Core Path 012/381 in Falkirk Council's network crosses A872 at Rover Carron. - Core Path 012/255 passes underneath A872 at Denovan Road. - Core Path 012/328 meets A872 south of Rosebank Avenue. - Does not form part of NCN.	northernmost 270m or so.	23 January 2023 at junction with Thistle Avenue. Involved one vehicle one pedestrian and caused injuries categorised as serious. 15 December 2023 at northern edge of Denny. Involved one vehicle and one pedestrian and caused fatal injuries.	
A872 between B818 and Denny Eastern Access Road	1.7	Fronted mainly by houses although most are set-back from the road with no direct vehicle or pedestrian access.	- Core Path 012/391 passes underneath A872. - Footway on eastern side for northernmost 1.1km or so. - Footway on western side for	- Single carriageway road with one lane in each direction and turning lanes at some junctions. - Subject to 30pmh speed limit.	12 June 2021 around 100m south of Johnston Place. Involved one vehicle and one pedestrian and caused injuries categorised as serious. 8 July 2023 at junction with	2



Section of Road	Length of Section (km Unless Stated)	Adjoining Land Uses	Facilities for Non- motorised Users	Road Configuration	Injury-Causing Accidents (2022 – 2024)	Rule to be Assessed Against
			southernmost 700m or so. - Occasional traffic islands to aid pedestrians. - Does not form part of NCN.		Ochilview. Involved one vehicle and one pedestrian and caused injuries categorised as serious. 23 May 2024 around 60m west of Myothill Road. Involved two vehicles and caused injuries to three people categorised as slight. 6 August 2020 at junction with Glasgow Road. Involved two vehicles and caused injuries categorised as slight.	



- 12.4.2 Data was extracted from the traffic surveys referred to in paragraph 12.3.13. The average vehicle movements during the weekday period 07:00 to 19:00 for the sections of road referred to above are summarised in **Table 12-9**.

Table 12-9: Observed Vehicle Movements

Location	Average 07:00 – 19:00 Weekday Vehicle Movements	
	All Vehicles	HGVs Only
B818 in the vicinity of the access to the Proposed Development	233	31
B818 in the vicinity of Old Mill Way in Stoneywood	2,105	208
A872 in the vicinity of West Boreland Road between the B818 and Stirling Street in Denny	3,768	410
A872 Stirling Street in the vicinity of Thistle Avenue in Denny	6,525	678
A872 in the vicinity of Woodland Way between the B818 and the DEAR	5,427	492

Future Baseline in Absence of Proposed Development

- 12.4.3 It would be reasonable to expect that the number of vehicle movements on the road network would increase as a result of traffic growth in the absence of the Proposed Development. Hence a 'low' growth factor of 1.020 from the National Road Traffic Forecasts ("NRTF") traffic dataset was applied to the observed vehicle movements to make them representative of 2029, the year when it is estimated that construction would commence.
- 12.4.4 A development of 130 homes is under construction at the time of writing on the site of the former Denny High School on northern side of the section of the A872 between the B818 and the DEAR (Falkirk Council) granted planning permission reference P/19/0795/FUL on 26 June 2020. Falkirk Council then granted two variations to this permission with references P/25/0149/FUL and P/19/0795/NMV02). This development will be accessed from the A872 and Glasgow Road and will add vehicle movements to the section of the A872 between the B818 and the DEAR.
- 12.4.5 Information submitted with the planning application for this development showed that its access from the A872 would be at a point around 250m east of the junction of the A872 and the DEAR. The application information also showed that this development would be expected to add around 95 daily vehicle movements to the section of the A872 west of the access.
- 12.4.6 This development would likely be occupied by the time construction of the Proposed Development commenced and hence the vehicle movements to and from it would represent a permanent change to the future baseline and would not have been captured in the traffic surveys referred to in paragraph 12.3.13. The additional vehicle movements arising from that development were therefore included in the future baseline vehicle movements.
- 12.4.7 The 95 daily vehicle movements arising from that development represent average vehicle movements over an entire day. They were factored to represent weekday vehicle movements over the period 07:00 – 19:00 based on data from the ATC on the A872 in the vicinity of Woodland Way between the B818 and the DEAR referred



to in 12.3.13. The resulting 2029 baseline vehicle movements are shown in **Table 12-10**.

Table 12-10: Estimated 2029 Baseline Vehicle Movements

Location	Average 07:00 – 19:00 Weekday Vehicle Movements	
	All Vehicles	HGVs Only
B818 in the vicinity of the access to the Proposed Development	238	31
B818 in the vicinity of Old Mill Way in Stoneywood	2,147	212
A872 in the vicinity of West Boreland Road between the B818 and Stirling Street in Denny	3,844	418
A872 Stirling Street in the vicinity of Thistle Avenue in Denny	6,655	691
A872 between the B818 and the DEAR	5,600	502

Receptor Sensitivity

12.4.8 The sensitivity of receptors on the sections of road within the Study Area has been assessed and is shown in **Table 12-11**.



Table 12-11: Sensitivity of Receptors by Potential Impact

Section of Road	Receptor Sensitivity by Potential Impact						Hazardous / Large Loads
	Severance	Road Vehicle Driver and Passenger Delay	Non-Motorised User Delay	Non-Motorised User Amenity	Fear and Intimidation of and by Road Users	Road User and Pedestrian Safety	
B818 between Proposed Development and Fankerton	Negligible since there is little frontage development and little demand to cross the road.	Negligible since baseline vehicle movements are relatively low and road uncongested.	Negligible since there is little frontage development and little demand to walk along or cross the road.			Low as no accident cluster locations have been identified on this section.	Moderate as there are established procedures for the movement of AILVs, but some temporary restrictions may be required.
B818 between Fankerton and A872	Low since there is some frontage development and demand to cross the road, but there are measures to assist pedestrians crossing.	Negligible since baseline vehicle movements are relatively low and road uncongested.	Low since there is some demand to walk along or cross the road.			Low as no accident cluster locations have been identified on this section.	Moderate as there are established procedures for the movement of AILVs, but some temporary restrictions may be required.
A872 between B818 and Stirling Street	Low since there is some frontage development and demand to cross the road, but there are measures to assist pedestrians crossing.	Low since road network generally uncongested.	Low since there is some demand to walk along or cross the road.			Low as no accident cluster locations have been identified on this section.	Moderate as there are established procedures for the movement of AILVs, but some temporary restrictions may be required.



Section of Road	Receptor Sensitivity by Potential Impact						
	Severance	Road Vehicle Driver and Passenger Delay	Non-Motorised User Delay	Non-Motorised User Amenity	Fear and Intimidation of and by Road Users	Road User and Pedestrian Safety	Hazardous / Large Loads
A872 Stirling Street in Denny	Low since there is some frontage development and demand to cross the road, but there are measures to assist pedestrians crossing.	Low since road network generally uncongested.	Low since there is some demand to walk along or cross the road.			Low as no accident cluster locations have been identified on this section.	Moderate as there are established procedures for the movement of AILVs, but some temporary restrictions may be required.
A872 between B818 and Denny Eastern Access Road	Low since there is some frontage development and demand to cross the road, but there are measures to assist pedestrians crossing.	Low since road network generally uncongested.	Low since there is some demand to walk along or cross the road.			Low as no accident cluster locations have been identified on this section.	Negligible as no AILVs are anticipated to use this section.



12.5 Embedded and Standard Mitigation

- 12.5.1 Embedded mitigation measures are those measures that are inherent to the Proposed Development. This includes mitigation by design (also known as Primary Mitigation), implemented through design iteration works as described in **Chapter 3: Description of the Development**.
- 12.5.2 A CTMP would be prepared, which would describe measures that would be implemented to control construction-related vehicles travelling to and from the Proposed Development. The submission of a CTMP could be made a condition of any consent granted for the Proposed Development. The types of matters that are envisaged to be covered in the CTMP are:
- Project Information:
 - Details of type and number of vehicle movements expected;
 - Details of the routes expected to be taken by HGVs; and
 - Details of AILV movements (including timing, routes, escorts, notification proposals and extent of any accommodation works).
 - Physical measures:
 - Arrangements for on-site temporary parking areas;
 - Arrangements for wheel cleaning prior to entering public road;
 - Sheeting of HGVs to prevent dust; and
 - Temporary speed reductions at any sensitive locations along with measures (such as vehicle activated signs) to encourage compliance.
 - Communication measures:
 - Arrangements for communicating with interested parties, including elected representatives and community councils;
 - Arrangements to agree protocol with emergency services; and
 - Arrangements for disseminating project information, including weekly updates of expected vehicle movements and work locations.
 - Enforcement measures:
 - Measures to encourage compliance with the identified routes;
 - Timing of deliveries to avoid any sensitive times (e.g. school start and finish times);
 - Code of conduct for HGV drivers;
 - 'Tool box talks' on relevant subjects;
 - A requirement that all HGVs operated by the Principal Contractor ("PC") must have Global Positioning System ("GPS") trackers, allowing their speed and routing to be recorded;
 - Contingencies for unobstructed access for emergency services; and
 - Procedures for dealing with non-compliance with the CTMP.
 - Maintenance measures:
 - Arrangements for liaison regarding winter maintenance;



- Arrangements for cleaning any sections of public road affected by material deposited from vehicles related to the construction of the Proposed Development;
- Arrangements for before-construction and after-construction road condition surveys, including an agreement under Section 96 of the Roads (Scotland) Act 1984; and
- Arrangements for remediation measures.
- Management of CTMP:
 - Arrangements for monitoring and updating the CTMP;
 - Confirmation of a named person with responsibility for implementation of the CTMP (including contact details); and
 - Development of a Travel Plan for staff, aimed at reducing the number of single-occupant car movements to and from the Proposed Development.

12.5.3 A trial run would be undertaken of the AILVs transporting the wind turbine components, which would confirm the accommodation works needed (such as removal of street furniture).

12.6 Scope of Assessment

Construction

Number of Construction Vehicle Movements

12.6.1 An indicative 16-month long construction programme is provided in **Chapter 3: Description of the Development**. The amount of material (and of items such as plant) required to be delivered to the Site has been calculated for each of the tasks shown in the programme. As stated in paragraph 12.3.3, the number of HGV movements assumes that all of the required aggregate would have to be delivered from off-site quarries. The number of staff likely to be present during each task has also been estimated.

12.6.2 The resultant number of HGV movements (including AILVs) and of cars and light vans for each task in the construction programme is shown in **Table 12-12**.

Table 12-12: Vehicle Movements by Construction Programme Task

Task	Starts in Month	Duration (Months)	Total HGV Movements	Total Car and Light Van Movements	Total Movements
Mobilisation	1	2	3,060	534	3,594
On-site access tracks	2	2	1,046	534	1,580
Temporary construction compounds	3	4	3,394	1,920	5,314
Substation civils works & installation	5	7	2,142	1,868	4,010
Crane hardstandings	5	3	3,490	1,120	4,610



Task	Starts in Month	Duration (Months)	Total HGV Movements	Total Car and Light Van Movements	Total Movements
Blade laydown	5	3	668	-	668
Turbine foundations	8	3	2,356	1,280	3,636
On-site cabling	10	3	720	480	1,200
Turbine delivery and erection	13	2	78	800	878
Commissioning & testing	15	2	-	428	428
Reinstatement	15	2	78	480	558
Total			17,032	9,444	26,476

- 12.6.3 **Table 12-12** shows that construction of crane hardstandings would be expected to generate the highest number of HGV movements. The peak number of vehicle movements during each month of construction would depend on the overlap of construction activities. Hence the vehicle movements shown in **Table 12-12** have been allocated to the construction programme shown in **Chapter 3: Description of the Development**. The resulting monthly vehicle movement estimates are presented in **Table 12-13** and on **Graph A**.
- 12.6.4 **Table 12-13** and **Graph A** also show the estimated number of daily vehicle movements based on an assumption of 20 working days per month (i.e. four weeks of Monday to Friday working per month). In reality, most months will have more than 20 working days and some activities may occur on Saturdays, hence the monthly vehicle movements may be spread over more working days than assumed. Using a 20-day month therefore provides a conservative assessment.
- 12.6.5 The data in **Table 12-13** shows that months five and six would be the busiest months for vehicle movements. During those months, there would be an estimated average of 183 vehicle movements each working day, of which on average 127 would be HGVs. Across the entire construction programme, there is estimated to be an average of 83 vehicle movements each working day, of which 53 would be HGVs. This information is also shown graphically on **Graph A**.
- 12.6.6 In order to facilitate the construction of the Proposed Development, some advanced tree felling would be required, with the resultant timber needing to be removed from the Site prior to construction commencing. The Site of the Proposed Development is a commercial forest, so felling and timber removal is an ongoing occurrence, however construction of the Proposed Development would require some felling to occur in advance of its current programme.
- 12.6.7 The report in **Technical Appendix 3.2: Forestry** states that around 75.8 hectares of timber would need to be removed from the Site before construction of the Proposed Development could commence. That area would translate to around 37,900 tonnes of timber, assuming around 500 tonnes per hectare. This would equate to around 1,895 loads of timber (assuming 20 tonnes of timber per HGV) and hence around 3,790 HGV movements.
- 12.6.8 These movements would occur over a year prior to construction starting and hence would equate to around 15 movements per working day (assuming 250 working days per year). These additional movements are lower than the peak of 127 HGV movements per day during construction and hence are not deemed to be material to the assessment of the Proposed Development.



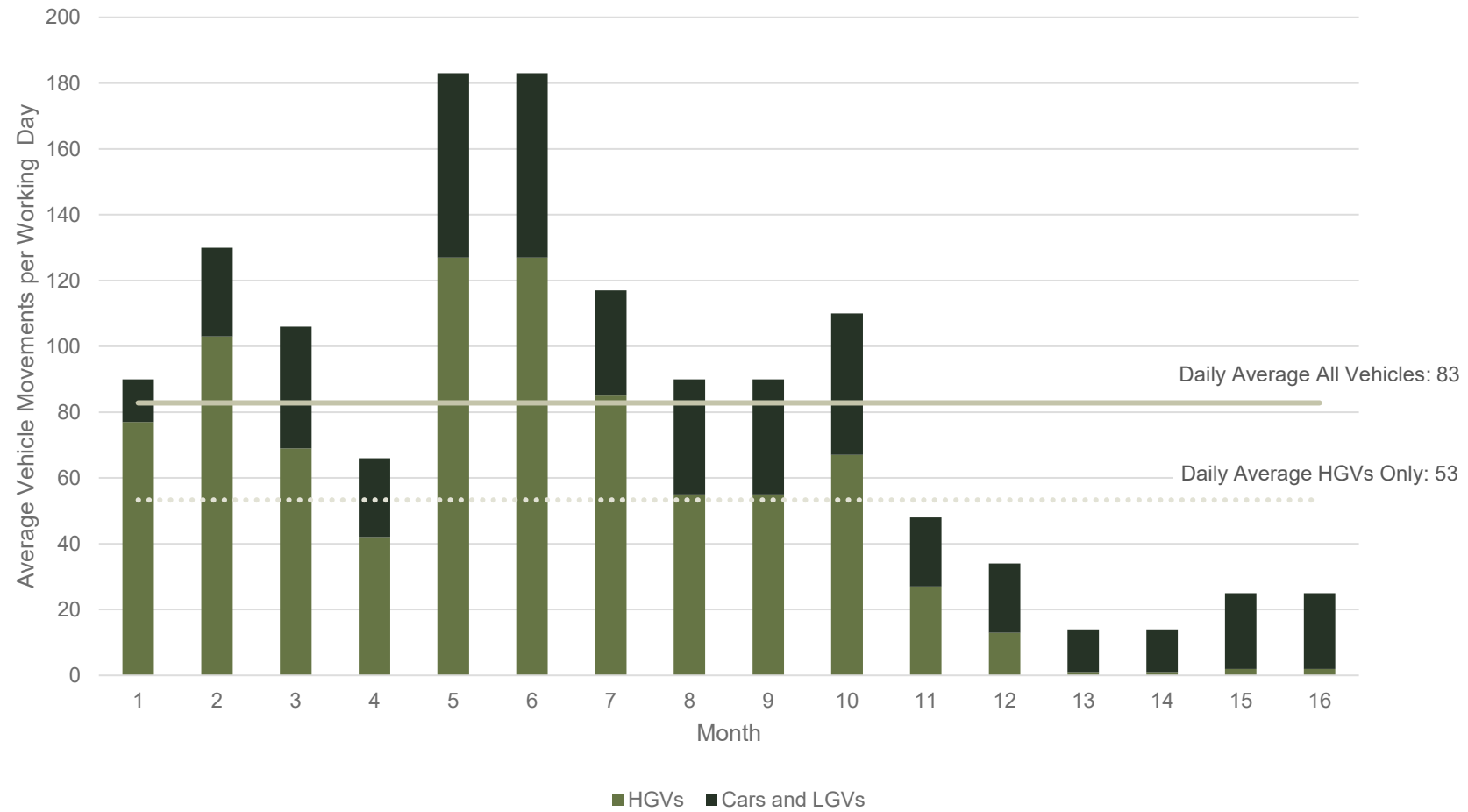
Table 12-13: Number of Vehicle Movements Per Month During Construction

Activity	Vehicle Type	Number of Vehicle Movements (Sum of Arrivals and Departures) Per Month in Construction Programme*															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Mobilisation	HGV	1,530	1,530														
Temporary construction compounds	HGV		523	523													
On-site access tracks	HGV			849	849	849	849										
Substation civils works & installation	HGV					306	306	306	306	306	306	306					
Crane hardstandings	HGV					1,163	1,163	1,163									
Blade laydown	HGV					223	223	223									
Turbine foundations	HGV								785	785	785						
On-site cabling	HGV										240	240	240				
Turbine delivery and erection	HGV												26	26	26		
Commissioning & testing	HGV																
Reinstatement	HGV															39	39
Staff Movements	Car and LGVs	267	534	747	480	1,120	1,120	640	694	694	854	427	427	267	267	454	454
Total Vehicle Movements per Month		1,797	2,587	2,119	1,329	3,661	3,661	2,332	1,785	1,785	2,185	973	693	293	293	493	493
Total HGV Movements per Month		1,530	2,053	1,372	849	2,541	2,541	1,692	1,091	1,091	1,331	546	266	26	26	39	39
Total Car and LGV Movements per Month		267	534	747	480	1,120	1,120	640	694	694	854	427	427	267	267	454	454
Average Vehicle Movements per Working Day		90	129	106	66	183	183	117	89	89	109	49	35	15	15	25	25
Average HGV Movements per Working Day		77	103	69	42	127	127	85	55	55	67	27	13	1	1	2	2
Average Car and LGV Movements per Working Day		13	27	37	24	56	56	32	35	35	43	21	21	13	13	23	23

*Please note that minor variations due to rounding may occur.



Graph A: Number of Average Daily Vehicle Movements Per Month During Construction





Route of Construction Vehicle Movements

- 12.6.9 The exact routes taken by construction vehicles would depend on the locations of suppliers and staff, which would remain uncertain until later in the procurement process. However, for the purposes of this assessment, it has been assumed that all vehicles would use the B818 between the Proposed Development and the A872 in Denny as explained in paragraph 12.3.9.
- 12.6.10 The A872 provides access to the M9 to the north, the M876 to the south-east and the M80 to the southwest. It is likely that these roads would be used by many vehicles travelling to and from the Proposed Development. Vehicle movements have therefore been split across the A872 as follows:
- A third of vehicles have been assumed to use the A872 north of the B818 to and from the Junction 9 of the M9, reflecting journeys that would have origins or destinations in Stirling or points accessed via the M9 or M80. This would also include journeys to and from Northfield Quarry, which is located to the west of the A872 north of Denny (shown on **Figure 12.1**).
 - A further third of vehicles have been assumed to use the A872 south of the B818 and then use the DEAR to and from Junction 1 of the M876 reflecting journeys that would have origins or destinations in areas such as Falkirk, Grangemouth and points served by the M9 to the east, such as Edinburgh.
 - A final third of vehicles have been assumed to use the A872 south of the B818 to access Junction 7 of the M80, reflecting journeys that have origins or destinations in areas such as Cumbernauld or Glasgow and other points served by the M80 to the west. This would also include journeys to and from Riskend Quarry, which is located to the north of the A803 west of the M80 (shown on **Figure 12.1**).

Comparison Against Future Baseline

- 12.6.11 The additional vehicle movements during the busiest months of construction (from **Table 12-13**) were compared to the future baseline vehicle movements (shown in **Table 12-10**) The resulting percentage increase in vehicle movements on each section of road within the Study Area was calculated.
- 12.6.12 That comparison and calculation is shown in **Table 12-14** (and on **Graph B**) along with the relevant 'Rule 1' or 'Rule 2' threshold (as described in **Table 12-8**). **Table 12-14** also identifies which sections of road are estimated to experience an increase in vehicle movements during construction above the appropriate threshold and hence be subject to further assessment.

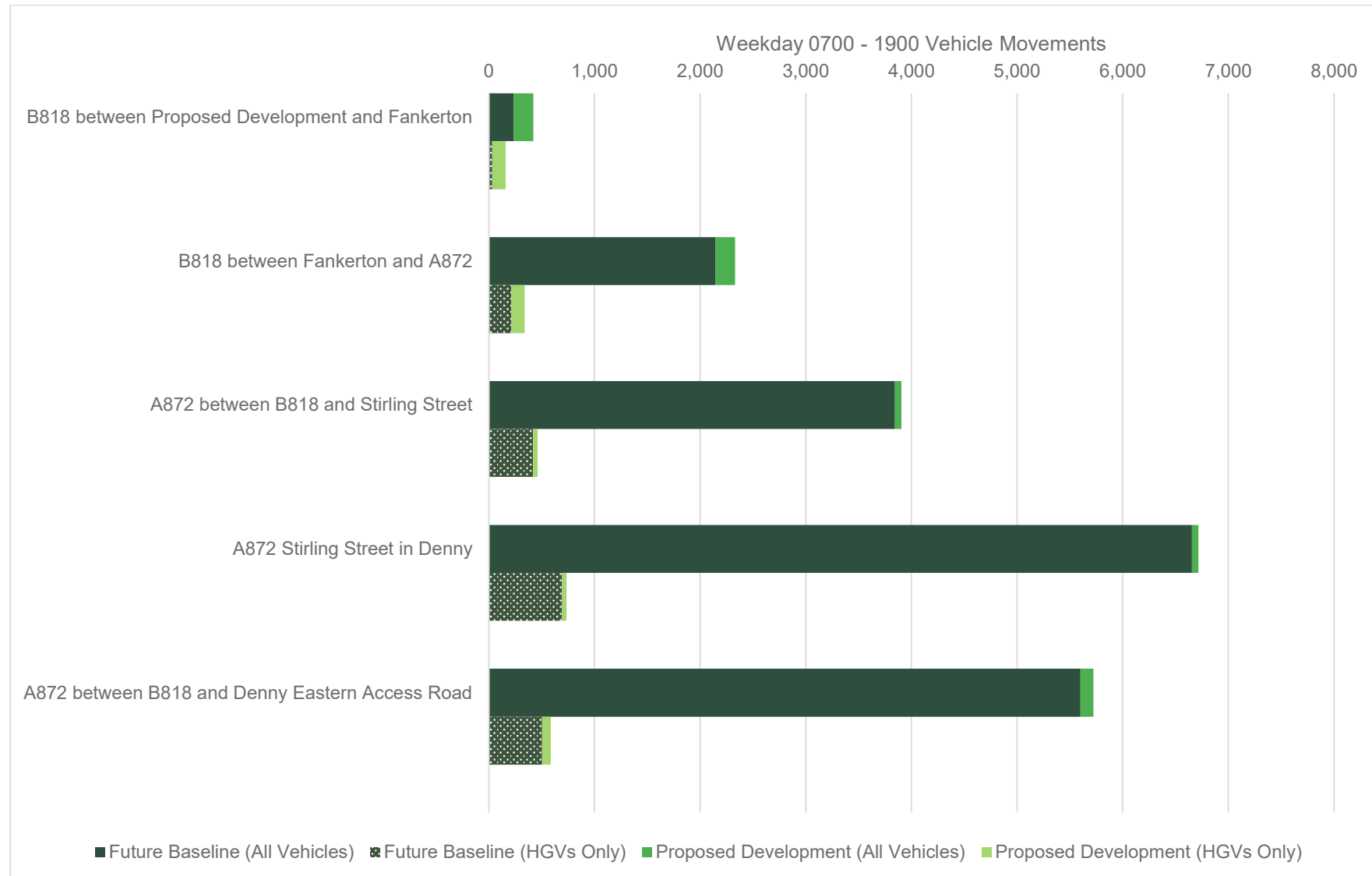


Table 12-14: Comparison of Additional Vehicle Movements Against Future Baseline

Location	2029 Future Baseline Average 0700 – 1900 Weekday Vehicle Movements		Additional Vehicle Movements per Working Day During Busiest Months		Increase in Vehicle Movements		Rule 1 Breached?	Rule 2 Breached? (if Applicable)	Subject to Further Assessment?
	All Vehicles	HGVs Only	All Vehicles	HGVs Only	All Vehicles	HGVs Only			
B818 between Proposed Development and Fankerton	238	31	183	127	77%	410%	Yes	Not applicable	Yes
B818 between Fankerton and A872	2,147	212	183	127	9%	60%	Yes	No	Yes
A872 between B818 and Stirling Street	3,844	418	61	42	2%	10%	No	No	No
A872 Stirling Street in Denny	6,655	691	61	42	1%	6%	No	No	No
A872 between B818 and Denny Eastern Access Road	5,600	502	122	85	2%	17%	No	No	No



Graph B: Comparison of Additional Vehicle Movements Against Future Baseline





Sections of Road to be Assessed

- 12.6.13 The data in **Table 12-14** shows that only the sections of the B818 between the access to the Proposed Development and Fankerton, and between Fankerton and the A872 would be expected to experience an increase in vehicle movements during construction large enough to warrant further assessment.
- 12.6.14 The ISEP Guidelines state *“It should be noted that the Rule 1 and Rule 2 ‘criteria’ process may not be appropriate for some impacts, and it is generally accepted by regulators and practitioners that it should not be applied to assessments of air quality, noise, road safety and driver delay”*. **Chapter 13: Noise** considers noise issues and air quality has been scoped out of this EIA Report.
- 12.6.15 The data in **Table 12-14** shows that those sections of road within the Study Area that do not breach the relevant Rule 1 or Rule 2 thresholds are all expected to experience an increase of vehicle movements arising from construction of 2% or less. Paragraph 12.3.23 quoted from the ISEP Guidelines that *“projected changes in traffic of less than 10% create no discernible environmental impact.”* The small increases in vehicle movements on these sections of road are therefore not considered to warrant further assessment on the matters of road safety and driver delay.

Route of AILV movements

- 12.6.16 The report in **Technical Appendix 12.1** identified the route described in paragraph 12.3.11 and shown on **Figure 12.2** for the delivery of the wind turbine components. The report identified that transporting the turbine blades would require use of a bladelifter AILV from a point north of Denny westwards. A bladelifter vehicle is a trailer hauled by an HGV tractor unit and has the ability to raise a blade to around 60° from the horizontal. This ability is required to allow the blades to negotiate constraints in Denny and on the B818.
- 12.6.17 The report considers transporting the wind turbine blades by a bladelifter vehicle all the way from Grangemouth and an alternative where the blades are transported by a conventional AILV (i.e. one which carries the blades horizontally) before transferring from them to the bladelifter AILV at a point on the A872 between Junction 9 of the M9 and Denny.
- 12.6.18 The location of the transfer point remains to be determined, but it would require a flat area where blades could be transferred from the conventional AILVs, stored and then transferred to the bladelifter AILV. Any transfer point would be subject to a separate consent application made in due course. The other components would be delivered by conventional AILVs.
- 12.6.19 The report in **Technical Appendix 12.1** concludes that the following works would be required to accommodate the AILVs (in addition to the potential transfer point on the A872 referred to above):
- Construction of an area of hardstanding at the A872 Nethermain Road / B818 junction.
 - Construction of an overrun area at the central island of the B818 / Kirkland Drive / Redwood Drive roundabout.
 - Construction of an overrun area on the B818 at Crummocksteps Farm.
 - Construction of an overrun area on the B818 at the Tak-ma-Doon Road Junction.
 - Construction of an overrun area on the B818 at Carron Valley hamlet.



- Construction of an overrun area on the B818 west of Carron Valley hamlet.

Number of AILV movements

- 12.6.20 The 'Turbine Delivery and Erection' task in **Table 12-13** includes AILVs delivering the wind turbine components. There would be nine components per wind turbine that would require AILV movements: the wind turbine blades (three movements per wind turbine), turbine tower sections (four per wind turbine), transformer and nacelle (each one per wind turbine). There would therefore be a total of 36 AILV movements required to deliver the turbine components.
- 12.6.21 It is anticipated that the AILVs carrying the wind turbine tower sections, transformer and nacelles would route directly from the port at which the components are delivered to the UK (currently anticipated to be Grangemouth as per paragraph 12.3.11) to the Site. There would be 24 movements of laden AILVs delivering these components and 24 movements of the unladen wind turbine component vehicles returning to the port (it is not anticipated that these would be classed as AILVs when travelling unladen).
- 12.6.22 Should the bladelifter AILV deliver the turbine components all the way from Grangemouth to the Site, then there would 12 movements of that vehicle laden and 12 movements of it unladen returning to the port.
- 12.6.23 Should conventional AILVs be used to deliver the turbine blades from Grangemouth to a transfer point on the A872, then there would be 12 movements of the conventional AILVs to the transfer point and 12 movements of the unladen wind turbine component vehicles returning to the port (again, it is not anticipated that these would be classed as AILVs when travelling unladen). There would then be 12 movements of the bladelifter AILV from the transfer station to the Site and 12 movements of it unladen returning to the transfer point.
- 12.6.24 The AILV convoys would be accompanied by escort vehicles (such as police cars and motorbikes) and support vehicles (such as vans from the haulier). The number of such vehicles has not been included in the numbers in **Table 12-13**.
- 12.6.25 A main crane and two assembly / support cranes would be required. These would likely be classed as AILVs too and would account for six movements (three to the Site and three from it). These vehicles have been included in the 'Turbine Delivery and Erection' task in **Table 12-13**.

Timing of AILV movements

- 12.6.26 It is common that AILVs travel in convoys of up to three vehicles. The 24 movements of the AILVs delivering the wind turbine tower sections, transformers and nacelles would translate to eight convoys. Wind turbine delivery would likely take place over the first two months of the three month 'turbine delivery and erection' task in **Table 12-13**. There would therefore likely be four convoys per month, equating to one a week on average.
- 12.6.27 There would be four convoys of AILVs delivering the blades from the port to the transfer station, should that method be used. Again, assuming that these take place over two months, then there would be one such convoy every two weeks on average. Over the three months during which turbine delivery would take place, that would equate to an average of around
- 12.6.28 There would be 12 movements of the bladelifter AILV laden and 12 of it unladen. Again, assuming that these occur over two months, there would be six return journeys of the bladelifter AILV each month and hence an average of one every five days.



- 12.6.29 The exact timing of the movement of these AILVs would be a matter to be agreed with the relevant roads authorities and the police. However, it would be in all parties' interests for the AILVs to move at a time that minimised impacts on other road users. Paragraph 6 of Schedule 5 of The Road Vehicles (Authorisation of Special Types) (General) Order 2003 gives the chief officer of police the power to vary the time, date or route of a proposed AILV movement and any police constable the power to halt the AILV in place on, or adjacent to, the road on which the AILV is travelling in the interests of road safety or to avoid undue traffic congestion.
- 12.6.30 There would be some disruption to other road users as each AILV convoy passed. However, any disruption from each convoy would be relatively short-lived. For example, pedestrians would be prevented from crossing the road at a particular point only for the length of time it would take for a convoy to pass. Temporary road closures would likely be required on the B818 to accommodate each AILV convoy, but again these would be in place only for the length of time it would take for a convoy to pass.
- 12.6.31 Signage would be erected at points along the entire route warning of the AILV movements and advance notice of their movements would be publicised, which would give other road users the chance to alter their journey to avoid being delayed by the AILV movements.

Operation

- 12.6.32 The Proposed Development would generate only the occasional maintenance or inspection vehicle movements once operational and these would be expected to cause no significant traffic and transport-related effects. The assessment of potential effects during operation has therefore been scoped out of the assessment.

Decommissioning

- 12.6.33 As described in **Chapter 3: Description of the Development**, effects associated with the construction phase can be considered to be representative of reasonable worst-case decommissioning effects. The number of vehicle movements generated during decommissioning would likely be lower than the number generated during construction as some of the below ground infrastructure may remain.
- 12.6.34 A CTMP would be prepared for decommissioning, which would describe the likely number of vehicles movements and present measures to manage these movements. The assessment of potential effects during decommissioning has therefore been scoped out of the assessment.

12.7 Assessment of Potentially Significant Effects

Construction

- 12.7.1 **Table 12-15** presents an assessment of the effects of the increase in vehicle movements during the busiest months of construction on the relevant sections of road identified in **Table 12-14**. The effects have been assessed on the basis that the mitigation measures listed in Section 12.5 of this chapter would be implemented.



Table 12-15: Assessment of Effects of Additional Construction Vehicle Movements

Location	Increase in Vehicle Movements	Severance	Road Vehicle Driver and Passenger Delay	Non-Motorised User Delay	Non-Motorised User Amenity	Fear and Intimidation of and by Road Users	Road User and Pedestrian Safety	Hazardous / Large Loads	Overall Significance
B818 between Proposed Development and Fankerton	- All: 183 (77%) HGVs: 127 (404%) - Increase equates to over three and a half minutes between successive additional vehicle movements (on average over the period 07:00 - 19:00)	- This section has a negligible sensitivity to Severance as per Table 12-11. - The additional vehicle movements are judged to represent a medium adverse impact as per Table 12-6. - A medium impact on a receptor of negligible sensitivity is judged to be a negligible adverse effect as per Table 12-7 which would be short-term, reversible and not significant.	- This section has a negligible sensitivity to Road Vehicle Driver and Passenger Delay as per Table 12-11. - The additional vehicle movements are judged to represent a small adverse impact as per Table 12-6. - A small impact on a receptor of negligible sensitivity is judged to be a negligible adverse effect as per Table 12-7 which would be short-term, reversible and not significant.	- This section has a negligible sensitivity to Non-Motorised User Delay as per Table 12-11. - The additional vehicle movements are judged to represent a small adverse impact as per Table 12-6. - A small impact on a receptor of negligible sensitivity is judged to be a negligible adverse effect as per Table 12-7 which would be short-term, reversible and not significant.	- This section has a negligible sensitivity to Non-Motorised User Amenity as per Table 12-11. - The additional vehicle movements are judged to represent a medium adverse impact as per Table 12-6. - A medium impact on a receptor of negligible sensitivity is judged to be a negligible adverse effect as per Table 12-7 which would be short-term, reversible and not significant.	- This section has a negligible sensitivity to Fear and Intimidation as per Table 12-11. Table 12.16 shows that the additional vehicle movements represent a negligible adverse impact. - A negligible impact on a receptor of negligible sensitivity is judged to be a negligible adverse effect of as per Table 12-7 which would be short-term, reversible and not significant.	- This section has a low sensitivity to Road Safety as per Table 12-11. - The additional vehicle movements are judged to represent a small adverse impact as per Table 12-6. - A small impact on a receptor of low sensitivity is judged to be a minor adverse effect as per Table 12-7 which would be short-term, reversible and not significant.	- This section has a moderate sensitivity to Hazardous Loads as per Table 12-11. - The 36 AILV movements over two months is judged to represent a small adverse impact as per Table 12-6. - A small impact on a receptor of moderate sensitivity is judged to be a minor adverse effect as per Table 12-7 which would be short-term, reversible and not significant.	Not significant
B818 between Fankerton and A872	- All: 183 (9%) HGVs: 127 (60%) - Increase equates to over three and a half minutes between successive additional vehicle movements (on average over the period 07:00 - 19:00)	- This section has a low sensitivity to Severance as per Table 12-11. - The additional vehicle movements are judged to represent a negligible adverse impact as per Table 12-6. - A negligible impact on a receptor of low sensitivity is judged to be a negligible adverse effect as per Table 12-7 which would be short-term, reversible and not significant.	- This section has a negligible sensitivity to Road Vehicle Driver and Passenger Delay as per Table 12-11. - The additional vehicle movements are judged to represent a negligible adverse impact as per Table 12-6. - A negligible impact on a receptor of negligible sensitivity is judged to be a negligible adverse effect as per Table 12-7 which would be short-term,	- This section has a low sensitivity to Non-Motorised User Delay as per Table 12-11. - The additional vehicle movements are judged to represent a negligible adverse impact as per Table 12-6. - A negligible impact on a receptor of low sensitivity is judged to be a negligible adverse effect as per Table 12-7 which would be short-term, reversible and not significant.	- This section has a low sensitivity to Non-Motorised User Amenity as per Table 12-11. - The additional vehicle movements are judged to represent a small adverse impact as per Table 12-6. - A small impact on a receptor of low sensitivity is judged to be a minor adverse effect as per Table 12-7 which would be short-term, reversible and not significant.	- This section has a low sensitivity to Fear and Intimidation as per Table 12-11. Table 12.16 shows that the additional vehicle movements represent a negligible adverse impact. - A negligible impact on a receptor of moderate sensitivity is judged to be a negligible adverse effect as per Table 12-7 which would be short-term, reversible and not significant.	- This section has a low sensitivity to Road Safety as per Table 12-11. - The additional vehicle movements are judged to represent a low adverse impact as per Table 12-6. - A small impact on a receptor of low sensitivity is judged to be a minor adverse effect as per Table 12-7 which would be short-term, reversible and not significant.	- This section has a moderate sensitivity to Hazardous Loads as per Table 12-11. - The 36 AILV movements over two months is judged to represent a small adverse impact as per Table 12-6. - A small impact on a receptor of moderate sensitivity is judged to be an effect of minor adverse significance as per Table 12-7 which would be short-term, reversible and not significant.	Not significant



Location	Increase in Vehicle Movements	Severance	Road Vehicle Driver and Passenger Delay	Non-Motorised User Delay	Non-Motorised User Amenity	Fear and Intimidation of and by Road Users	Road User and Pedestrian Safety	Hazardous / Large Loads	Overall Significance
			reversible and not significant .						

Table 12.16: Calculation of Level of Fear and Intimidation

Location	Future Baseline							Future Baseline and Proposed Development								Impact Magnitude	
	Average 18-hour Traffic Flow (All Vehicles, Per Hour) (a)	Total 18-Hour HGVs (b)	Average Vehicle Speed (mph) (c)	Degree of Hazard Score				Level of Fear and Intimidation	Average 18-hour Traffic Flow (All Vehicles Per Hour) (a)	Total 18-Hour HGVs (b)	Average Vehicle Speed (mph) (c)	Degree of Hazard Score					Level of Fear and Intimidation
				a	b	c	Total					a	b	c	Total		
B818 between Proposed Development and Fankerton	16	36	36	0	0	20	20	Small	26	163	36	0	0	20	20	Small	Negligible
B818 between Fankerton and A872	144	237	25	0	0	10	10	Small	154	364	25	0	0	10	10	Small	Negligible



- 12.7.2 The assessment in **Table 12-15** concludes that no significant effects on users of the transport network are expected to arise from the vehicle movements generated during the busiest two months of construction of the Proposed Development. The assessment assumes that all aggregate required for construction would be imported by road from off-site quarries. Should the proposed on-site borrow pit provide suitable stone, then less stone would need to be imported by road from off-site quarries and hence there would be fewer vehicle movements and lesser effects.

Operation

- 12.7.3 The assessment of potential effects during operation has been scoped out of the assessment as per paragraph 12.6.32

Decommissioning

- 12.7.4 The assessment of potential effects during decommissioning has been scoped out of the assessment as per paragraph 12.6.33.

12.8 Additional Mitigation and Enhancement

- 12.8.1 The preceding assessments have shown that no additional mitigation is required beyond that described in Section 12.5.

12.9 Residual Effects

- 12.9.1 No significant residual effects are expected on traffic and the transport network during the construction, operation and decommissioning of the Proposed Development.

12.10 Cumulative Assessment

- 12.10.1 **Chapter 5: Environmental Impact Assessment** identifies a number of wind farm developments that may give rise to cumulative effects in combination with the Proposed Development. These developments have been assessed to determine whether, together with the Proposed Development, they could result in cumulative impacts on users of the transport network.
- 12.10.2 Vehicle movements generated by any of those developments which were under construction or operational during the period for which traffic data has been collected would be included in the baseline vehicle movements reported in **Table 12-9**. No further allowance need be made for the vehicle movements generated by those developments.
- 12.10.3 Only the potential cumulative developments listed in **Chapter 5: Environmental Impact Assessment** which are the subject of undetermined applications or consented but not under construction have therefore been considered as potential cumulative developments. However, cumulative effects would arise from the Proposed Development and these developments only if vehicle movements to and from them affected the same sections of the road network as the Proposed Development and their construction phases overlapped.
- 12.10.4 **Table 12-17** shows the potential cumulative developments listed in **Chapter 5: Environmental Impact Assessment** which are the subject of undetermined applications or consented but not under construction. The information submitted with the applications for each of those developments was reviewed to identify if any vehicles to and from each of them would use the same sections of the road network as the Proposed Development. That information is also summarised in **Table 12-17**.



Table 12-17: Potential Cumulative (Consented or Application) Wind Farms

Project Name	Potential for Cumulative Effects with Proposed Development?
Consented	
Earlsburn Extension	No. Would be accessed from the A811 and vehicles travelling to and from this development would not use the road network within the Study Area.
Shelloch	No. Would be accessed from the A811 and vehicles travelling to and from this development would not use the road network within the Study Area.
Bartlett Factory	No. Would be accessed from the A73 and vehicles travelling to and from this development would not use the road network within the Study Area.
Application / appeal	
Drummarnock	No. Would be accessed via New Line Road and the A872 north of the M9. Potential for stone to be sourced from Northfield Quarry (accessed from the A872 north of the Study Area). These vehicles would route to and from Junction 9 of the M9 to the north and would not be in the Study Area.

- 12.10.5 In addition to the wind farm developments listed in **Table 12-17**, a review of the Stirling Council and Falkirk Council planning portals has identified a further development which could affect vehicle movements within the Study Area.
- 12.10.6 Planning application P/21/0566/FUL seeks consent for the 'Erection of 228 Dwellinghouses with Associated Infrastructure, Landscaping and Engineering Works (Site A)' on land at Mydub Farm, Glasgow Road, Denny, FK6 5JU. This application, which is undetermined at the time of writing, is for homes to the north of, and accessed from, the DEAR.
- 12.10.7 Information submitted with the application shows that it is predicted to add 171 vehicle movements to the section of the A872 between the B818 and the DEAR. These additional vehicle movements, when added to those generated by the Proposed Development on this section of the A872, would result in an increase of 293 vehicle movements (of which 85 would be HGVs). This would represent an increase of 5% in all vehicles and 17% in HGVs, increases which would not breach the 10% 'Rule 2' threshold on this section of road and hence not warrant any further assessment.

12.11 Summary and Statement of Significance

- 12.11.1 This assessment has considered the potential effects on users of the transport network arising from the Proposed Development. The assessment has identified that vehicle movements would peak during months five and six of construction and the number of vehicle movements assumes that all stone would need to be imported by road from off-site quarries. The effects of these vehicle movements, and of the AILVs delivering the wind turbine components, have been assessed and found to be not significant. No significant effects are also expected when the Proposed Development is considered in combination with other planned developments.
- 12.11.2 The number of vehicle movements during the operation and decommissioning of the Proposed Development would be lower than those during construction and hence not significant effects are expected on users of the transport network during those phases.



Table 12-18: Summary of Effects

Description of Effect	Mitigation/Enhancement Measure(s)	Significance of Residual Effect	
		Level and Significance	Beneficial / Adverse
During Construction & Decommissioning			
Severance	Implementation of CTMP	B818 between Proposed Development and Fankerton: medium (negligible). B818 between Fankerton and A872: negligible (negligible).	Adverse
Road Vehicle Driver and Passenger Delay		B818 between Proposed Development and Fankerton: small (negligible) B818 between Fankerton and A872: negligible (negligible).	Adverse
Non-Motorised User Delay		B818 between Proposed Development and Fankerton: small (negligible) B818 between Fankerton and A872: negligible (negligible).	Adverse
Non-Motorised User Amenity		B818 between Proposed Development and Fankerton: medium (negligible) B818 between Fankerton and A872: small (minor).	Adverse
Fear and Intimidation of and by Road Users		B818 between Proposed Development and Fankerton: negligible (negligible) B818 between Fankerton and A872: negligible (negligible).	Adverse
Road User and Pedestrian Safety		B818 between Proposed Development and Fankerton: small (minor) B818 between Fankerton and A872: small (minor).	Adverse
Hazardous / Large Loads		B818 between Proposed Development and Fankerton: small (minor) B818 between Fankerton and A872: small (minor).	Adverse
During Operation			
Scoped-out of assessment			
Cumulative Effects			
As assessed for Proposed Development in isolation during construction.			



12.12 References

Literature

Davis, S., Hoare, D., Howard, R., Ross, A. (2023) *Institute of Environmental Management and Assessment (IEMA) Guidelines: Environmental Assessment of Road Traffic and Movement*. ISEP, London. Available at: <https://www.isepglobal.org/media/5mrmquib/iema-report-environmental-assessment-of-traffic-and-movement-rev07-july-2023.pdf>

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12.13 Abbreviations List

Abbreviation	Meaning
AADT	Annual Average Daily Traffic
AILV	Abnormal Indivisible Load Vehicle
ATC	Automatic Traffic Counter
CTMP	Construction Traffic Management Plan
DEAR	Denny Eastern Access Road
DfT	Department for Transport
EIA	Environmental Impact Assessment
FC	Falkirk Council
GPS	Global Positioning System
HGV	Heavy Goods Vehicle
HV	Heavy Vehicle
IEMA	Institute of Environmental Management and Assessment
ISEP	Institute of Sustainability and Environmental Professionals
LGV	Light Goods Vehicle
MAVRIC	Mapping Application for Visualising Road Injury Casualties
NCN	National Cycle Network
NRTF	National Road Traffic Forecast
PC	Principal Contractor
SC	Stirling Council



Making Sustainability Happen



Chapter 13: Noise

Environmental Impact Assessment Report

Cairnoch Hill Wind Farm

3 August 2026



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Figures

Figure 13.1: Construction Noise Assessment Study Area;

Figure 13.2: Operational Noise Assessment Locations;

Figure 13.3: Cumulative Wind Turbine Locations;

Figure 13.4: Construction Traffic (Stage 1);

Figure 13.5: Construction Traffic – Worst Case (A);

Figure 13.6: Construction Traffic – Worst Case (B);

Figure 13.7: Construction Traffic – Average Case (A); and

Figure 13.8: Construction Traffic – Average Case (B).



Revision	Prepared By	Checked By	Approved By	Description
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13.0 Noise

13.1 Introduction

13.1.1 This Chapter considers the likely significant effects of the noise associated with the construction, operation and decommissioning of the Proposed Development.

13.1.2 The specific objectives of the chapter are to:

- Describe the existing noise baseline context and cumulative context;
- Describe the assessment methodology and significance criteria used in completing the impact assessment;
- Describe the potential effects, including direct, indirect and cumulative effects;
- Describe the mitigation measures proposed to address any likely significant effects; and
- Assess any residual effects remaining following the implementation of mitigation.

13.1.3 This chapter is supported by the following Figures and Technical Appendices:

- Volume 3d: Figures
 - **Figure 13.1: Construction Noise Assessment Study Area;**
 - **Figure 13.2: Operational Noise Assessment Locations;**
 - **Figure 13.3: Cumulative Wind Turbine Locations;**
 - **Figure 13.4: Construction Traffic (Stage 1);**
 - **Figure 13.5: Construction Traffic – Worst Case (A);**
 - **Figure 13.6: Construction Traffic – Worst Case (B);**
 - **Figure 13.7: Construction Traffic – Average Case (A);** and
 - **Figure 13.8: Construction Traffic – Average Case (B).**
- Volume 4: Technical Appendices
 - **Technical Appendix 13.1: Construction Noise Report;** and
 - **Technical Appendix 13.2: Operational Noise Report.**

13.1.4 Figures and Technical Appendices are referenced in the text where relevant.

13.1.5 The assessment has been undertaken in accordance with relevant policy, legislation and guidance as standard for similar development proposals in this area. These are set out in **Technical Appendix 4.1: Legislation, Guidance and Policy**.

13.1.6 An assessment of the Proposed Development's compliance with relevant policy is given in the separate, standalone **Planning Statement** provided as part of the planning application.

13.2 Consultation

13.2.1 Consultation undertaken prior to the Environmental Impact Assessment (EIA) Scoping stage has been described in the EIA Scoping Report. Relevant consultee responses included in the Scoping Opinion, and post-Scoping consultation relevant to noise, are summarised in **Table 13-1**.



Table 13-1: Summary of Consultation

Consultation Details	Consultee Comments	Applicant Response
Stirling Council Scoping Opinion (October 2024)	The Council's Environmental Health team agreed with the use of ETSU-R-97 supplemented by the IOA GPG to assess operational wind turbine noise, and the use of BS 5228 to assess construction noise. The Council agreed that decommissioning noise and construction vibration could be scoped out of the assessment. In respect of Low Frequency Noise and Amplitude Modulation, the Council stated that they would seek specialist advice by their peer review consultants at the time of an application being made.	Operational noise assessment has been undertaken in accordance with guidance contained in the UK Government document '<i>Assessment and Rating of Wind Turbine Noise</i>' 2026 (which replaces ETSU-R-97) and the IOA GPG. Construction noise assessment has been undertaken in accordance with BS 5228. Decommissioning noise and construction vibration have not been considered further. Low Frequency Noise and Amplitude Modulation are discussed in detail within Sections 3.2 and 3.3 of Technical Appendix 13.2, respectively. It has been deemed appropriate that they are not considered further in this assessment.
Post-Scoping Consultation		
Stirling Council Environmental Health Department (February 2025)	It was agreed that the use of fixed minimum limits of 40 dBA during the daytime, and 43 dBA during the night-time, was appropriate for the derivation of the Total ETSU-R-97 Noise Limits. It was agreed that fixed Total ETSU-R-97 Noise Limits which do not vary with wind speed are appropriate given it was difficult to conduct a baseline survey due to existing operational wind farms in the area. It was stated that the noise from fixed plant (such as the proposed substation) at nearby noise sensitive receptors should be assessed in accordance with BS 4142:2014+2019 Methods for rating and assessing industrial and commercial sound, or justification for this element of the operational phase assessment being scoped out should be given.	The Total Noise Assessment Criteria (TNAC) have been derived based on a Lower Limiting Value of 40 dBA during the daytime, and 43 dBA during the night-time. The TNAC do not vary as a function of windspeed as it was not appropriate to measure background sound levels in this instance due to the close proximity to operational wind turbines in the area. Operational noise from fixed plant, such as the proposed substation, have been scoped out of the assessment, as detailed in Section 13.8.



Consultation Details	Consultee Comments	Applicant Response
	As well as a construction noise assessment in accordance with BS 5228, it was also stated that the increase in road traffic noise during the construction phase should be assessed in accordance with the Calculation of Road Traffic Noise and the Design Manual for Roads and Bridges LA111 Revision 2, or provide justification for the construction phase assessment being scoped out.	Increased road traffic noise during the construction phase has been assessed as per this request, the results of which are detailed within Section 13.9.

13.3 Assessment Methodology and Significance Criteria

- 13.3.1 Wind farms have the potential to create noise during their construction and operational phases. This chapter details the assessment of the potential noise impacts at the nearest Noise Sensitive Receptors (NSRs), which are residential dwellings proximate to the Proposed Development and/ or noise producing activities associated with the construction and operational phases of the Proposed Development.

Proposed Development

- 13.3.2 Predictions of wind turbine noise for the Proposed Development were made based upon the sound power level data for a candidate wind turbine, the Vestas V162 7.2MW with serrated trailing edge blades, a hub height of 99m and a tip height of 180m, which is a representative worst case assumption for the type of wind turbine that may be installed for the Proposed Development. Whatever the final wind turbine choice is, the Proposed Development would have to meet the noise limits determined and contained within any planning condition applied as part of the consent. Further detail on the Proposed Development is presented within **Chapter 3**.

Study Area

- 13.3.3 NSRs are properties that are sensitive to noise and, therefore, require protection from nearby noise sources. The Study Area for the assessment of environmental noise is usually defined through the identification of the closest NSRs to the Proposed Development.
- 13.3.4 The assessment of noise attributable to the Proposed Development considers the nearest and most sensitive NSRs only, on the assumption that if noise levels at these receptors are within the defined limits, then noise levels at NSRs at greater distances should also be within acceptable levels.
- 13.3.5 Note that, for the purposes of this assessment, residential dwellings are classed as properties that lawfully exist and are deemed habitable, or have extant planning permission, at the time of this assessment. No other receptors with sensitivity to noise, as detailed in Section 2.2 of the UK Government titled document 'Assessment and Rating of Wind Turbine Noise' (ARWTN), were identified within the study area.
- 13.3.6 Although the Study Area considers all of the residential NSRs around the Proposed Development, a smaller number of Noise Assessment Locations (NALs) are defined, and these NALs are selected to represent either individual or clusters of NSRs. NALs are the points at which noise levels are calculated and assessed.



- 13.3.7 The assessment locations for some groups of NSRs are different between the construction and operational noise assessments (as they consider noise occurring from different types of noise sources and noise source locations), therefore, the assessment locations are defined as Construction Noise Assessment Locations (CNALs) for the construction noise assessment and NALs for the operational noise assessment.

Construction Noise – Study Area

- 13.3.8 The CNALs are shown on **Figure 13.1: Construction Noise Assessment Study Area** and have been selected as representative of the closest NSRs to the location of the Proposed Development (“the Site”) and Proposed Development construction activities. The CNALs refer to the position on the curtilage of a property where the predictions of construction noise levels have been made. The assessment is undertaken on the assumption that if noise levels are within acceptable levels at the CNALs, then it is reasonable to assume they would also be acceptable at more distant locations.
- 13.3.9 A total of seven CNALs were chosen, and these are presented within **Technical Appendix 13.1**.
- 13.3.10 The CNALs coordinates are detailed in **Table 13-2** in British National Grid (BNG) format.

Table 13-2: Construction Noise Assessment Locations

CNAL Name	Easting (BNG)	Northing (BNG)
CNAL1 - Glendales Farmhouse	272463	684356
CNAL2 - Reservoir Keepers House	271612	684005
CNAL3 - Cairnoch Farm	269302	684500
CNAL4 - Cairnoch Bothy	269275	684519
CNAL5 - Todholes	267304	686079
CNAL6 - Cairnoch Lodge	270317	686773
CNAL7 - Easter Cringate	270468	686868

Construction Traffic Noise – Study Area

- 13.4 Access to the Proposed Development for general construction traffic is anticipated to be from the east via the B818 road and connecting A872 road. The proposed construction traffic route is shown on **Figure 13.4: Construction Traffic (Stage 1)**. The construction traffic noise assessment considers vehicle movements along these roads and the associated residential receptors located adjacent to the route. Specifically, the assessment includes properties within 50 m of the affected road network and/or within a 55 dB LA10 noise contour.

Operational Noise – Study Area

- 13.4.1 The operational wind farm NALs were defined at an early stage of the project before the wind turbine layout and the Site was fixed. The NALs were selected considering initial noise level predictions based on early feasibility studies, the scoping layout, and the potential for that layout to evolve i.e. considering the potential for wind turbines to be located elsewhere within the Site. As such, there are now more NALs than are strictly required for the assessment, however, the NALs have remained the



same throughout the evolution of the layout design to maintain consistency throughout the project timeline, and are useful to demonstrate the operational noise impacts for all dwellings in the local area i.e. not just those that are the closest.

- 13.4.2 A total of 11 NALs have been used, and these are shown on **Figure 13.2: Operational Noise Assessment Locations** and detailed in **Table 13-3**. The NALs are also presented within **Technical Appendix 13.2**.

Table 13-3: Operational Noise Assessment Locations

NAL Name	Easting (BNG)	Northing (BNG)
NAL1 - Glendales Farmhouse	272463	684356
NAL2 - Reservoir Keepers House	271612	684005
NAL3 - Cairnoch Farm*	269302	684500
NAL4 - Cairnoch Bothy*	269275	684519
NAL5 - Gartcarron Fintry	267041	685938
NAL6 - Todholes	267304	686079
NAL7 - Cairnoch Lodge*	270317	686773
NAL8 - Easter Cringate*	270468	686868
NAL9 - Easter Cringate Cottage**	271742	687532
NAL10 - Earlsburn Cottage	270632	688296
NAL11 - Ryecroft	272485	688106

* The occupiers are financially involved with the Proposed Development.

** The occupiers are financially involved with Craigengelt Wind Farm.

- 13.4.3 There are a number of operational, consented, and proposed wind farms in the vicinity of the Proposed Development, and these are shown on **Figure 13.3: Cumulative Wind Turbine Locations** and are summarised in **Table 13-4**.

Table 13-4: Cumulative Wind Developments

Wind Farm	Number of Turbines	Status	Make and Model of Turbine Considered in Modelling
Craigannet Farm	1	Operational	Vensys VE82, 1.5 MW
Craigengelt Wind Farm	8	Operational	Nordex N90, 2.5 MW
Earlsburn North Wind Farm	9	Operational	Nordex N90/2500HS, 2.5 MW
Earlsburn Wind Farm	20	Operational	Nordex N80, 2.5 MW
Earlsburn Extension Wind Farm	7	Consented	Vestas V117, 4.2 MW, with Serrated Blades & Vestas V136, 4.0 MW, with Serrated Blades
Shelloch Wind Farm	5	Consented	Vestas V150, 6.0 MW, with Serrated Blades & Vestas V136, 4.0 MW, with Serrated Blades
Drummarnock Wind Farm	4	In Planning	Nordex N163, 7 MW, with Serrated Blades



- 13.4.4 All of the wind turbine developments detailed above have been considered as part of the cumulative operational noise assessment.
- 13.4.5 Further information on the cumulative noise assessment can be found in **Technical Appendix 13.2**.

Desk Study

- 13.4.6 Throughout the noise assessment, tasks such as data analysis and noise predictions were undertaken in appropriate computer software, as detailed within **Technical Appendix 13.1**, and **Technical Appendix 13.2**, respectively. The desk-based assessment was informed by data sources such as Google Earth Aerial Imagery and OS Terrain 50 height data.

Field Surveys

- 13.4.7 No field surveys were undertaken for the noise assessment of the Proposed Development.

Assessment of Potential Effect Level and Significance

Construction Noise - Methodology

- 13.4.8 The prediction of construction noise levels was undertaken using the calculation methodology presented in International Standard ISO 9613-2:2024, 'Acoustics – Attenuation of sound during propagation outdoors' (ISO 9613).
- 13.4.9 The construction noise assessment was undertaken using the guidance contained in BS 5228: Part 1 2009+A1:2014 (BS 5228) using the following steps:
- Identify the nearest Noise Sensitive Receptors (NSRs) to potential construction activities and select representative Construction Noise Assessment Locations;
 - Identify the applicable threshold of significant effects from BS 5228;
 - Predict the noise levels for construction noise activities occurring across the proposed construction timetable;
 - Compare predicted noise levels against the applicable thresholds;
 - Where necessary, develop suitable mitigation measures to minimise any significant adverse effects during the construction phase; and
 - Assess any residual adverse effects, taking into account any identified mitigation measures.
- 13.4.10 Noise levels from the construction of the Proposed Development will be influenced by the selection, placement and operation of plant and equipment and associated construction traffic. The selection of plant and equipment to be used will be determined by the appointed Contractor and detailed arrangements for on-site management will be decided at that time. The construction noise assessment has therefore been based upon a typical selection of plant for a project of this size, and assesses typical construction activities that are likely to occur over the duration of the construction period. To this end, noise level predictions have been made across each month of the construction period, and for each month the plant has been modelled operating in the likely closest activity areas to each receptor for any given activity, whereas in reality plant will move around the Site and for much of the time may be operating at more distant locations.
- 13.4.11 The core hours for construction activity are anticipated to be 07:00 - 19:00 Monday to Friday and 07:00 – 16:00 Saturday. Standard construction activities are not



anticipated outside of the above times, with no construction work taking place on Sundays or Bank Holidays. Outwith these specified hours, maintenance works, emergency works and construction works shall be limited to wind turbine erection, commissioning, maintenance, dust suppression and pouring of concrete foundations, unless otherwise approved in advance in writing by Stirling Council. Standard construction activities are not anticipated outside of the above times; however, it should be noted that some activity outside of the core hours could arise, under certain conditions. Examples include construction activities that cannot be stopped once they have begun, such as wind turbine erection or concrete pours; or where deliveries need to occur outside of standard working hours, for example, to receive Abnormal Indivisible Loads (AILs).

- 13.4.12 No construction activities are anticipated during the night-time, however, there may be a requirement for some plant to be operational during night-time, for example, a portable generator to provide lighting for safety purposes. A night-time scenario was therefore, also considered within the construction noise assessment.
- 13.4.13 **Chapter 3** outlines the tasks that would be undertaken during the construction phase. For the purposes of the noise assessment noise modelling has been undertaken for months 1 to 16.
- 13.4.14 The following list provides an indicative overview of the construction activities assumed to be occurring across the construction timeline that have been included in the noise propagation modelling:
- Month 1 - Initial works begin on site with the upgrading of the original access road onto the Site, improving Site accessibility, alongside the felling of trees to clear turbine site locations;
 - Month 2 - Site Establishment commences and Access Road Improvements are temporarily completed. Initial Felling activities are completed;
 - Month 3 - Site Establishment continues with more deliveries arriving to site;
 - Month 4 - Site Establishment is completed and secondary felling activities are undertaken. The temporary construction compounds commence operation;
 - Month 5 - Access tracks from existing roads towards Turbine 1 (T1) are constructed;
 - Month 6 - Secondary Access Road Improvements begin at the site entrance. Construction of Access tracks from existing roads towards Turbine 2 (T2) and Turbine 3 (T3), and construction of Crane Pad at T1. The borrow pit begins operation;
 - Month 7 - Secondary Access Road Improvements at the site entrance and construction of Access Tracks from existing roads towards Turbine 4 (T4). Construction of Crane Pad at T2 alongside the beginning of construction of the Substation;
 - Month 8 - Turbine Foundation excavation at T1 alongside the construction of Crane Pad at T3;
 - Month 9 - Turbine Foundation excavation at T1 and construction of Crane Pads at T4;
 - Month 10 - Turbine Foundation construction at T1 and Turbine Foundation excavation at T2. Initial turbine deliveries begin;
 - Month 11 - Turbine Foundation construction at T2 and Turbine Foundation excavation at T3;



- Month 12 - Turbine Foundation construction at T3 and Turbine Foundation excavation at T4. Turbine deliveries are completed;
- Month 13 - Turbine Foundation construction at T4. Turbine Erection at T1;
- Month 14 - Turbine Erection at T2;
- Month 15 - Turbine Erection at T3;
- Month 16 - Turbine Erection at T4, completion of the substation, and cessation of the borrow pit and temporary construction compounds; and
- Night-time – Diesel generators for power and lighting within the temporary construction compounds.

13.4.15 The use of blasting for the establishment of the borrow pit has not been considered within the Construction Noise Assessment, the reasoning for which is presented within **Table 13:8** below.

13.4.16 The noise-generating equipment included in the noise model is detailed in **Technical Appendix 13.1**. It is noted that for much of the working day, the noise associated with the construction activities would be less than predicted, as the assessment has assumed all equipment is operating continuously at full power and located at the closest points to receptors within its anticipated activity location, whereas in practice, equipment load and precise location would vary.

3.6 Methodology for the Prediction of Construction Traffic Noise

13.4.17 The assessment of noise from construction activities is typically undertaken in accordance with BS 5228-1:2009+A1:2014, however, there is no specific guidance available for the assessment of noise from construction traffic travelling to/from a designated construction area, for example, on public roads. Therefore, a bespoke assessment methodology has been derived, drawing on guidance presented in Calculation of Road Traffic Noise (CRTN) and Design Manual for Roads and Bridges (DMRB) LA111 Noise and Vibration.

13.4.18 CRTN provides a methodology for the prediction of road traffic noise, which can be undertaken with due consideration of traffic flows, vehicle speed, percentage of Heavy Goods Vehicles (HGVs), road surface and gradient.

13.4.19 DMRB provides a methodology for the assessment of road traffic noise on new or upgraded trunk roads. It provides guideline noise levels for road traffic for the short term i.e. when a new road is first opened, and for the long term, permanent situation. For this assessment, the short-term recommendations have been used, as all traffic noise associated with the construction of the Proposed Development will be temporary in nature.

13.4.20 The assessment of construction traffic noise is undertaken with reference to both existing baseline traffic and proposed construction traffic i.e. it considers the change in traffic flows that may occur during the construction phase.

13.4.21 The assessment methodology follows a three-stage process:

- Stage 1 Scoping – to differentiate between road sections that need further assessment and road sections where negligible noise impacts will occur.
- Stage 2 Simple Assessment – to determine whether road traffic noise is above or below a threshold where adverse effects may occur (the Lowest Observable Adverse Effects Level (LOAEL)).
- Stage 3 Detailed Assessment – To determine the magnitude of change for road sections where the LOAEL is exceeded.



- 13.4.22 The assessment uses the following terminology:
- Baseline traffic flow. This is the traffic count data scaled up for the peak year of construction.
 - Development traffic flow. This is the traffic flow attributable to the construction of the Proposed Development only.
 - Total traffic flow. This is the baseline traffic flow plus the Proposed Development traffic flow.

Stage 1 Scoping Assessment: Methodology

- 13.4.23 For each road section to be assessed, the baseline traffic flow is compared to the predicted traffic flow. It is generally recognised that an increase in traffic flow of 25% or a decrease in traffic flow of 20% results in a noise level change of 1 dB, and in respect of the Scoping stage, DMRB states: *“is the project likely to cause a change in the [baseline noise level] of 1dB LA10,18hr in the do-minimum opening year (DMOY) compared to the do-something opening year (DSOY)?”*.
- 13.4.24 In this case, the DMOY (Do Minimum) is taken as the baseline traffic flow in 2029 without the Proposed Development present and the DSOY (Do Something) is the 2029 baseline traffic flow plus any traffic associated with the construction of the Proposed Development.
- 13.4.25 Where road sections are determined to have an increase in traffic flow of less than 25%, no further assessment is required, as any increase in traffic flow will be negligible in terms of noise, i.e. less than a 1 dB change. In this instance, construction traffic effects would be considered Not Significant.

Stage 2 Simple Assessment: Methodology

- 13.4.26 Where the need for further assessment is identified, a study area is defined to consider all NSRs in the vicinity of the road section of interest (i.e. that is to be considered through simple assessment). The study area is usually defined as 600 m from new roads and 50 m from other roads, although variations in the study area are allowed to suit the individual project. In this case, no new public roads are being considered, so the study area has been set to a 50 m radius, either side of all roads of interest.
- 13.4.27 Road traffic noise levels are then modelled on the road section of interest in accordance with CRTN, as modified by the Appendix A ‘Operation Noise Calculations’ recommendations in DMRB.
- 13.4.28 DMRB uses the concept of Observable Adverse Effects Levels to inform noise assessments. The LOAEL i.e. the minimum level required for adverse effects to occur, is defined in DMRB as 55 dB L10,18 hour (façade) for daytime (06:00 – 24:00). Where the predicted noise levels are below the indicator of the LOAEL, no further assessment is necessary and construction traffic effects would be considered Not Significant.

Stage 3 Detailed Assessment: Methodology

- 13.4.29 If NSRs are identified within the study area with noise levels above the LOAEL, then the next step is to determine a magnitude of change, as detailed in 3.54a of DMRB and replicated in this report as **Table 13-5**.
- 13.4.30 DMRB provides values for Magnitude of Change in the ‘short-term’ and ‘long-term’. Short-term refers to year one / year of opening, whereas long-term refers to year 15. The assessment for short-term is much more stringent, with a change of +5 dB



indicating a Major Magnitude of Change, as opposed to +10 dB for Major, which is used for the long-term.

- 13.4.31 The values for short-term Magnitude of Change are most appropriate to assess a construction phase, as construction noise will be of a short-duration and temporary i.e. there is no long-term construction noise.

Table 13-5: DMRB Magnitude of Change - Short Term

Short Term Magnitude	Short Term Noise Change (dB LA10,10hour)
Major	Greater than or equal to 5.0
Moderate	3.0 to 4.9
Minor	1.0 to 2.9
Negligible	Less than 1.0

- 13.4.32 As stated previously, as there is no specific methodology for the assessment of construction traffic noise, an 'Initial Assessment of Operational Noise Significance' is then undertaken in line with the DMRB, with due regard to the values presented in **Table 13-5**, where:

- a Major or Moderate magnitude of change is deemed to be Significant; and
- a Negligible or Minor magnitude of change is deemed to be Not Significant.

- 13.4.33 The levels of magnitude of change in the above bullets are taken directly from DMRB.

- 13.4.34 Following on from the 'Initial Assessment of Operational Noise Significance', DMRB states: *"Where the magnitude of change in the short term is negligible at noise sensitive buildings, it shall be concluded that the noise change will not cause changes to behaviour or response to noise and as such, will not give rise to a likely significant effect."*

- 13.4.35 Where a Minor, Moderate or Major magnitude of change is identified, then additional considerations need to be made to determine the 'Final Operational Significance on Noise Sensitive Buildings' in line with the DMRB. These considerations may include:

- Noise level change (whether the magnitude of change is close to the minor/moderate boundary);
- Differing magnitude of change in the long term to magnitude of impact in the short term;
- Absolute noise level with reference to LOAEL and Significant Observable Adverse Effects Levels (SOAEL);
- Location of noise sensitive parts of a receptor;
- Acoustic context; and
- Likely perception of change by residents.

Operational Noise - Methodology

- 13.4.36 In Scotland, the Onshore Wind Policy Statement 2022 (Section 3.7.1) states:

"The Assessment and Rating of Noise from Wind Farms' (Final Report, Sept 1996, DTI), (ETSU-R-97) provides the framework for the measurement of wind turbine noise, and all



applicants are required to follow the framework and use it to assess and rate noise from wind energy developments.”

13.4.37 Section 3.73 and 3.74 of the Onshore Wind Policy Statement notes that:

‘The Scottish Government is aware that the UK Government has been considering the extent to which ETSU-R-97 may require updating to ensure it is aligned with the potential effects from more modern turbines. The Scottish Government supports this work and we anticipate the results of a short-term review project in due course.

Until such time as new guidance is produced, ETSU-R-97 should continue to be followed by applicants and used to assess and rate noise from wind energy developments.’

13.4.38 On 19th June 2026, the UK Government published updated guidance for the ‘Assessment and Rating of Wind Turbine Noise’ (hereafter referred to as ARWTN). The ARWTN guidance replaces the previous guidance ETSU-R-97 ‘The Assessment and Rating of Noise from Wind Farms’ but is designed to be used alongside the good practice guidance produced by 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).

13.4.39 In relation to policy the ARWTN document itself states, in Section 1.12, that:

‘Reference to ETSU-R-97 in UK planning policy or guidance should be interpreted to mean a reference to this technical guidance, which replaces ETSU-R-97.’

13.4.40 Therefore, the Proposed Development operational noise assessment has been undertaken in accordance with ARWTN and the IOA GPG. ARWTN provides a robust basis for determining acceptable noise limits for wind farm developments. Consequently, the test applied to operational noise is whether or not the calculated wind farm noise levels at nearby noise sensitive properties would be below the noise limits derived in accordance with ARWTN.

Setting of Noise Limits

13.4.41 Operational wind turbine noise limits differ between daytime and night-time periods. The daytime criteria are typically set based upon background sound levels measured during the ‘quiet periods of the day’ comprising:

- All evenings from 18:00 - 23:00;
- Saturday afternoons from 13:00 - 18:00; and
- All day Sunday from 07:00 - 23:00.

13.4.42 Nonetheless, the derived limits apply to the entire daytime period (07:00 – 23:00).

13.4.43 Night-time periods are defined as 23:00 - 07:00 with no differentiation made between weekdays and weekends.

13.4.44 ARWTN recommends that wind farm noise for the daytime period should be limited to 5 dB(A) above the prevailing background or a Lower Limiting Value (LLV) within the range 35 - 40 dB $L_{A90,10min}$, whichever is the higher. However, in this instance, the Total Noise Assessment Criteria (TNAC) have not been derived as a function of background sound levels, the reasoning for which is detailed in Section 13.5. The choice of daytime LLV within the range 35-40 dB is determined based on three factors which consider the planning impacts and merits of the wind farm(s) in relation to noise. The three factors are presented below in priority order (i.e. the largest weight should be given to the first factor):



- The generating capacity of the wind farm and the likely consequence that the choice of LLV would have on the energy generation of the wind farm(s).
- The number of dwellings in the neighbourhood of the wind farm(s) and the magnitude of the levels to which these are exposed.
- The duration and level of exposure to wind turbine noise of dwellings in the neighbourhood of the wind farm(s).

- 13.4.45 The choice of daytime LLV should be considered in the national context (Scotland, England, Wales and Northern Ireland) *'as the range of wind energy projects, national policy priorities, and population density in practice can vary in each case'*. The three factors are discussed in further detail in Section 6.4 of **Technical Appendix 13.2**.
- 13.4.46 Where a wind farm is to be developed in an area where other wind turbine developments have been consented the method of assessment considers two sets of noise limits. Firstly, a set of TNAC are defined for all wind turbines operating cumulatively. Secondly, a set of Site Specific Noise Limits (SSNL) are set to ensure individual turbine developments will not increase the cumulative noise level above the TNAC.
- 13.4.47 Following a review of the noise limits for other wind farm/turbine developments in the surrounding area, and consideration of the three factors listed above, the TNAC for the Proposed Development operating in conjunction with other cumulative schemes has been set at 40 dB(A) during the daytime period; and at 43 dB(A) during the night-time period. Further detail of this selection is presented within **Technical Appendix 13.2**. To reiterate, this TNAC relates to noise from all wind farm developments in the area.
- 13.4.48 The apportionment calculation described above determines the proportion of the TNAC that is available for future wind farms taking account of operational and consented wind farms in the area (hereafter referred to as the 'residual noise budget').
- 13.4.49 The residual noise budget effectively represents the maximum SSNL that would be appropriate to allocate to the Proposed Development, however ARWTN details that it may not be appropriate to allocate all the residual noise budget to a proposed wind farm, instead it states that it may be only be appropriate to allocate a proportion of the residual noise budget to retain headroom for developments which may be proposed in the future.
- 13.4.50 Apportionment of the noise limits was undertaken in accordance with current good practice and ARWTN, the process of which is detailed in **Technical Appendix 13.2**.
- 13.4.51 The exception to the setting of both the daytime and night-time LLV on the noise limits occurs where a property occupier has a financial involvement in the wind farm development. In this case the LLV can be increased to 45 dB(A).
- 13.4.52 In addition to ARWTN, the recommendations included in the IOA GPG have been considered in the noise assessment.

Calculation of Wind Turbine Noise

- 13.4.53 The exact model of turbine to be installed on the Site will be the result of a future tendering process, should consent be granted. Achievement of the Site Specific Noise Limits determined by this assessment will be a key determining factor in the final choice of turbine for the Proposed Development. Predictions of wind turbine noise for the Proposed Development were made based upon the sound power level data for a single candidate wind turbine, the Vestas V162 7.2 MW with serrated



trailing edge blades, a hub height of 99m and a tip height of 180m, which is considered representative of the type of wind turbine that would be installed at the Site.

- 13.4.54 Noise predictions have been undertaken using the propagation model contained within Part 2 of ISO 9613. The model calculates, on an octave band basis, attenuation due to geometric spreading, atmospheric absorption and ground effects. The noise model was set up to provide realistic noise predictions, including mixed ground attenuation ($G=0.5$), atmospheric attenuation relating to 70% relative humidity and 10 °C and a receiver height of 4m.
- 13.4.55 Typically wind farm noise assessments assume all properties are downwind of all wind turbines at all times (as this would result in the highest wind turbine noise levels). However, where properties are located in between groups of wind turbines they cannot be downwind of all wind turbines simultaneously, and it is more appropriate to consider the effect of wind direction on predicted noise levels. Due to the presence of other wind turbines in the area, the impact of directivity has been considered in the assessment. Further information on the methodology adopted where this condition comes into effect, is provided in **Technical Appendix 13.2**.
- 13.4.56 The wind turbine noise immission levels are based on the $L_{A90,10 \text{ minute}}$ noise indicator in accordance with the recommendations in ARWTN, which are obtained by subtracting 2 dB(A) from the wind turbine sound power level data (L_{Aeq} indicator).
- 13.4.57 Propagation across a valley (concave ground) increases the number of reflection paths, and in turn, has the potential to increase sound levels at a given receptor. Conversely, terrain screening effects (barrier corrections) act as blocking points, and reductions in sound levels at a given receptor can potentially be observed. Accordingly, and in line with the IOA GPG, an assessment has been undertaken to determine whether a concave ground profile correction (+3 dB) or barrier correction (-2 dB), is required due to the topography between the wind turbines and any residential NSRs. A concave ground and barrier correction was found to be required for a number of wind turbines at a number of receptors, and this is detailed in Annex 4 of **Technical Appendix 13.2**.
- 13.4.58 More information relating to the parameters for modelling operational noise discussed above, and on other topics such as Amplitude Modulation (AM) and Low Frequency Noise (LFN), has been provided in **Technical Appendix 13.2**.
- 13.4.59 There is no evidence that LFN has adverse impacts on the health of wind farm neighbours and at the time of writing there is no agreed methodology that can be used to predict the occurrence of AM.

Calculation of Wind Turbine Noise

- 13.4.60 The need for a cumulative noise assessment was considered in accordance with the guidance contained within the IOA GPG. There are a number of operational, consented, and proposed wind farms in the vicinity of the Proposed Development; as such, and where required, a cumulative noise assessment was undertaken. The noise assessment was undertaken in three separate stages:
- Stage 1 – establish the TNAC for each Noise Assessment Location (NAL);
 - Stage 2 – undertake noise modelling to determine whether noise predictions from the Proposed Development on its own are within 10 dB of the noise predictions from other wind turbines within the area; where wind turbine predictions are within 10 dB then a cumulative noise assessment is undertaken; and



- Stage 3 – establish the SSNL for the Proposed Development (through apportioning the TNAC) and compare the noise predictions from the Proposed Development on its own against the SSNL.

- 13.4.61 The aim of the operational noise assessment, therefore, was to establish the TNAC, determine the likely impacts of the Proposed Development and other schemes at the nearest NSRs, derive SSNL and to determine whether the Proposed Development could meet those limits.
- 13.4.62 All the wind turbines modelled in the cumulative noise assessment (Stage 2), are summarised in Annex 4 of **Technical Appendix 13.2**. Uncertainty in sound power data for the Proposed Development, and the other cumulative developments, has been accounted for using the guidance contained within Section 4.2 of the IOA GPG, with uncertainty values for each modelled turbine detailed within Annex 5 of **Technical Appendix 13.2**. The location of the wind turbines for the Proposed Development and the other schemes are shown on **Figure 13.3**.

Construction Noise – Significance Criteria

- 13.4.63 BS 5228, Appendix E Part E.3.2 provides example thresholds for potential significant effects at dwellings, which can be used for assessing the significance of construction noise effects. Three categories of threshold levels are defined (A, B and C). The Category A noise threshold values were deemed applicable for all NSRs on a precautionary basis.
- 13.4.64 The Category A threshold levels used for determining the significance of construction noise effects are provided in **Table 13-6** below:

Table 13-6: Construction Noise Category A Criteria

Significance of Effect Category A	Criteria Thresholds	
	Criteria Met	Criteria Exceeded
Daytime (07:00 - 19:00) and Saturdays (07:00 - 13:00)	≤65dB LAeq, 12 hr	>65dB LAeq, 12 hr
Evenings and Weekends (19:00 - 23:00)	≤55dB LAeq, 12 hr	>55dB LAeq, 12 hr
Night-time (23:00 - 07:00)	≤45dB LAeq, 12 hr	>45dB LAeq, 12 hr

- 13.4.65 It should be noted that exceedance of the threshold limit does not in itself indicate a significant effect, rather, the standard states:

“If the site noise level exceeds the appropriate category value, then a potential significant effect is indicated. The assessor then needs to consider other project-specific factors, such as the number of receptors affected and the duration and character of the impact, to determine if there is a significant effect.”

Construction Traffic Noise – Significance Criteria

- 13.4.66 Only residential receptors are considered in this assessment, which are classified as having a high level of sensitivity. A magnitude of change is determined, if necessary, rather than determining a magnitude of impact for construction traffic noise.
- 13.4.67 **Table 13-7** details how the significance of effects from construction traffic noise are determined, with due regard to the road traffic noise Stage 1, Stage 2 and Stage 3 assessments, and the magnitude of change presented in **Table 13-5**.



Table 13-7: Level of Significance of Effects from Construction Traffic Noise

Noise Level / Magnitude of Change	Assessment Stage	Level of Significance
Change in Road traffic flow rates below 20%; or	As determined in Stage 1. These roads can be scoped out	Not Significant
Total Road traffic noise below LOAEL; or	As determined in Stage 2 assessment	Not Significant
Negligible magnitude of change	As determined in Stage 3 assessment with reference to the levels presented in Table 13-5	Not Significant
Minor magnitude of change	As determined in Stage 3 assessment with reference to the levels presented in Table 13-5	Not Significant, depending on the context
Moderate magnitude of change	As determined in Stage 3 assessment with reference to the levels presented in Table 13-5	Significant, depending on the context
Major magnitude of change	As determined in Stage 3 assessment with reference to the levels presented in Table 13-5	Significant, depending on the context

Operational Noise – Significance Criteria

13.4.68 As detailed in 13.4.35 above, ETSU-R-97 was recently replaced by ARWTN. ‘Interaction with policy’ is discussed in Sections 1.12-1.19 of ARWTN. Specific considerations relating to Policy in England and Northern Ireland are detailed first and then Scotland and Wales are discussed separately. The Noise Policy Statement for England introduces the principles of a LOAEL (Lowest Observed Adverse Effect Level) and a SOAEL (Significant Observed Adverse Effect Level) for noise.

13.4.69 In terms of defining LOAEL and SOAEL, ARWTN states:

“Defining LOAELs and SOAELs for wind turbine noise, in the context of the NPSE guidelines in England or the NPSNI in Northern Ireland, is outside the scope of this technical guidance. However, based on the current state of knowledge, the noise assessment criteria derived in this document are not expected to exceed the SOAEL, although they may be above the LOAEL in some cases.

When adverse but non-significant effects (above the LOAEL and below the SOAEL) are predicted following assessment and compliance with this technical guidance, further noise minimisation is not required as a matter of policy in the context of sustainable development. It is recognised that noise minimisation is likely to be achieved through iterative layout design and the selection of appropriate wind turbine technology, with the outcome of this process ultimately tested and constrained by the assessment process set out in this guidance.”

13.4.70 In relation to Scotland, Section 1.18 states:



“Like in England, there are references to ETSU-R-97 in planning policy and guidance for Scotland and Wales, however the concepts of LOAEL / SOAEL are not included in national policies within these administrations. Nevertheless, national policies in these administrations are broadly similar, in that they support renewable energy generation (including from onshore wind) provided there are no unacceptable adverse impacts including from noise.”

13.4.71 Section 1.19 of ARWTN then states:

“The same general comments as in paragraphs 1.13 to 1.17 therefore apply, and compliance with the present technical guidance is considered a way of satisfying these requirements.2

13.4.72 Achievement of ARWTN derived noise limits ensures that turbine noise will comply with current Government guidance.

13.4.73 The use of the term ‘significance’ in this chapter in relation to operational wind turbine noise, therefore, refers to compliance/non-compliance with the ARWTN derived noise limits. For situations where predicted wind turbine noise meets or is less than the noise limits defined in ARWTN, then the noise effects are deemed to be not significant. Any breach of the ARWTN derived noise limits due to the Proposed Development is deemed to result in a significant effect in terms of the EIA Regulations.

Committed Mitigation and Enhancement

13.4.74 Where potentially significant effects are identified, taking account of embedded (primary) and standard (tertiary) mitigation, additional mitigation measures (secondary mitigation) are described. These measures are presented as commitments, with information provided on how the mitigation can be secured, for example through planning conditions.

Assessment of Residual Effect Level and Significance

13.4.75 The assessment of residual effects follows the same process and criteria as the assessment of potential effects but takes account of the committed additional (secondary) mitigation and enhancement measures.

Limitations to Assessment

13.4.76 As described in Section 3.4 of **Technical Appendix 13.1**, several assumptions have been made when predicting likely construction noise levels. These assumptions are considered to result in ‘worst case’ noise predictions, and realistically, noise levels are likely to be lower than predicted for much of the construction period.

13.4.77 A candidate wind turbine has been used for predictions of operational wind farm noise from the Proposed Development. The final model of wind turbine to be used may differ from that presented here, however the operational noise levels from the Proposed Development would have to comply with the noise limits imposed within the noise condition attached to any deemed planning permission granted.

13.4.78 As agreed with Stirling Council Environmental Health Officer (EHO), no background sound measurements were undertaken for the Proposed Development to inform the baseline. However, as a precautionary measure, the BS 5228 Category A Threshold Levels (which are the most stringent available in BS 5228) have been used to determine whether predicted construction noise levels are significant. Additionally, having TNACs which do not vary with background sound levels is also an inherently cautious approach, as typically the TNACs increase in step with the



- background sound levels at the higher wind speed ranges when background sound levels are within 5 dB of the LLVs.
- 13.4.79 No other assumptions or data gaps have been identified.
- 13.4.80 Whilst some limitations due to the assumptions made have been identified, it is considered that there is sufficient information to enable an informed decision to be taken in relation to the identification and assessment of likely significant noise effects.

13.5 Baseline Conditions

- 13.5.1 As detailed within the Post Scoping Consultation Letter in Annex 2 of **Technical Appendix 13.2**, and as agreed by the Stirling Council EHO, it was not appropriate in this instance to undertake a baseline survey to establish background sound levels at NSRs proximate to the Proposed Development. The reason for this was two-fold; firstly there are a number of operational wind farms in the vicinity of the Proposed Development such that obtaining background sound measurements which are not contaminated by operational wind turbine noise was likely not possible; and secondly, the historic background sound levels for nearby receptors, which have been most recently presented within the noise assessment for Earlsburn Wind Farm Extension (ref: ECU00004510), whilst representative, are referenced to a point located upon the Earlsburn site (noting that the Proposed Development is located upon Cairnoch hill, to the south of the Earlsburn site).
- 13.5.2 It was therefore not appropriate to derive TNAC as a function of these background sound levels due to the difference in wind speed reference. It is noted that this approach (the use of limits which do not vary with wind speed) was also agreed for the nearby proposed Drummarnock Wind Farm (ref: 24/00494/FUL).
- 13.5.3 Whilst the background sound levels presented for Earlsburn Extension Wind Farm have not been deemed appropriate to derive the TNAC for the Proposed Development; they still provide representative background sound levels at Earlsburn Cottage and New Cairnoch Lodge (Cairnoch Lodge). On this basis, an excerpt from the Earlsburn Extension Wind Farm EIA Report Noise Assessment, which details the background sound environment at these receptors, has been included in Annex 3 of **Technical Appendix 13.2** for context.
- 13.5.4 For construction traffic noise, baseline traffic flow data has been taken from Automatic Traffic Count (ATC) points and scaled up for a 2029 baseline year, as reported in **Chapter 12 Traffic and Transport**.

Future Baseline in Absence of Proposed Development

- 13.5.5 There are no other known current or predicted future processes that are likely to change the future baseline conditions in the absence of the Proposed Development.

13.6 Embedded and Standard Mitigation

- 13.6.1 Embedded mitigation measures are those measures that are inherent to the Proposed Development. This includes mitigation by design (also known as Primary Mitigation), implemented through design iteration works as described in **Chapter 2: Design Evolution and Alternatives**. Throughout the design process the layout of the Proposed Development was reviewed to optimise wind turbine numbers and locations, subject to a wide range of identified constraints inclusive of noise. This was undertaken to ensure that noise was considered as a factor in the design of the Proposed Development.



13.6.2 Standard mitigation (also known as Tertiary Mitigation) includes all mitigation usually assumed to be in place during construction, operation and decommissioning, and is generally regarded as industry standard or Best Practice. Committed standard mitigation measures are set out in **Chapter 3** the following being specifically applicable to noise:

- The use of ARWTN which provides a robust basis for determining appropriate noise limits and ensures that appropriate limits are placed on operational noise.
- To reduce noise impacts from construction and decommissioning activities at noise sensitive receptors, best practice noise control measures, as detailed in BS 5228-1:2014, will be included in the Construction Environment Management Plan (CEMP), an outline version of which is provided as **Technical Appendix 3.1**.

13.7 Scope of Assessment

13.7.1 **Table 13-8** provides a summary of which receptors and impacts have been scoped in or out of the assessment.



Table 13-8: Summary of Assessment Scope

Receptor/Impact	Scoped In?		Comments
	Construction	Operation	
Potential impact of construction activities at nearest NSRs.	Yes	No	-
Potential cumulative construction noise impacts should construction activities occur at the same time as the construction for the nearby proposed developments.	Yes	No	-
Potential impact of noise resulting from construction traffic at nearby NSRs.	Yes	No	-
Potential impact of operational noise from the Proposed Development at NSRs located in proximity to the Proposed Development.	No	Yes	-
Potential impact of cumulative operational noise from the Proposed Development operating in conjunction with other proposed, operational and consented developments in the area.	No	Yes	-
Potential Impact of Substation Operational Noise Impacts at nearest NSRs	No	No	Due to the separation distance between the proposed substation and the nearest NSRs to the south west (Cairnoch Bothy and Farm - 1.2km) and the relatively small scale of the substation, operational noise levels from the substation at the nearest NSRs would be very low. On this basis, operational noise from the substation has been scoped out of the EIA.
Vibration	No	No	Vibration from wind turbines is low therefore on that basis it was not considered necessary to carry out a specific assessment of perceptible vibration and it has been scoped out of the EIA. However, further information on vibration can be found in Section 3.2 of Technical Appendix 13.2 .
Blasting	No	No	The extent of any blasting requirement cannot be determined until intrusive site investigation tests are completed. Nevertheless, should blasting be required, a series of tests would be undertaken by the appointed contractor in accordance with guidance outlined in BS 5228-2:2009+A1:2014.



Receptor/Impact	Scoped In?		Comments
	Construction	Operation	
			In addition, blasts would be designed through appropriate specification of Maximum Instantaneous Charge (MIC) to ensure that vibration levels at the nearest NSR's would not exceed the guideline limits presented in BS 7385-2: 1993 'The Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration' and BS 6472-2: 2008 'Guide to evaluation of human exposure to vibration in buildings. Blast-induced vibration'. A condition could be attached to the consent to require compliance with these limits. Given the relative distances between the potential locations of blasting and the closest noise sensitive receptors, there is no reason to suggest that the guidance within BS 7385 and BS 6472 would not be met, and therefore this issue can be scoped out of further detailed consideration.
Low Frequency Noise and Infrasound (Wind Turbines)	No	No	The term infrasound can be defined as the frequency range below 20 Hz, while low frequency noise (LFN) is typically in the frequency range 20 – 200 Hz. Wind turbines do not produce significant levels of infrasound or LFN, as supported by the studies discussed in Section 3.2 of Technical Appendix 13.2. As such, the assessment of infrasound and LFN from operational wind turbines has been scoped out of the EIA.
Amplitude Modulation	No	No	In the context of wind turbine noise, Amplitude Modulation (AM) describes a variation in noise level over time; for example, observers may describe a 'whoosh whoosh' sound, which can be heard close to a wind turbine as the blades sweep past. AM of aerodynamic noise is an inherent characteristic of wind turbine noise. The acoustics community, however, has sought to make a distinction between the AM which is expected at most wind farms and as such may be considered as 'Normal Amplitude Modulation' (NAM), to the atypical AM that has sometimes been heard at some wind farms, hereinafter referred to as 'Other Amplitude Modulation' (OAM). Further detail of which is presented within Section 3.3 of Technical Appendix 13.2. OAM is used to describe an unusual feature of aerodynamic noise from wind turbines, where a greater than normal degree of regular fluctuation in sound



Receptor/Impact	Scoped In?		Comments
	Construction	Operation	
			level occurs at blade passing frequency, typically about once per second. At time of writing there is no agreed methodology which can be used to predict the occurrence of AM. ARWTN provides a suggested planning condition which now includes consideration of AM. The condition includes a mechanism for an AM penalty to be applied where AM over a certain level occurs and the additional guidance included in ARWTN details the methodology that should be used to do this.



Decommissioning

- 13.7.2 As described in **Chapter 3**, effects associated with the construction phase can be considered to be representative of reasonable worst-case decommissioning effects, therefore no separate assessment of the decommissioning phase is presented in this chapter.

13.8 Assessment of Potentially Significant Effects

Construction Noise

- 13.8.1 The construction noise impact results are summarised below in **Table 13-9**. Further details of the modelling and assessment can be found in **Technical Appendix 13.1**.
- 13.8.2 The predicted construction noise levels are below both the BS 5228 Daytime Category A threshold value of 65 dBA and the BS 5228 Evening and Weekend Category A threshold value of 55 dBA at all CNALs.
- 13.8.3 No construction activities are anticipated during the night-time, however, some generation plant or similar may operate during night-time hours within the construction compounds. The predicted noise levels for the modelled night-time scenario are below the night-time Category A threshold value of 45 dBA.



Table 13-9: Predicted Construction Noise Immission Levels

CNAL	Category A Threshold Levels dB L _{Aeq, t}			Immission Level, dB L _{Aeq, t} for each Month/ Scenario																
	Daytime 07:00 – 19:00 and Saturdays 07:00 - 13:00	Evenings 19:00 – 23:00 weekdays, Weekends 13:00- 23:00 Saturdays and 07:00- 23:00 Sundays	Night time 23:00- 07:00	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Night
CNAL1	65	55	45	23	34	32	32	32	33	35	34	34	34	34	35	35	31	31	34	16
CNAL2	65	55	45	27	35	34	32	34	35	35	35	35	35	35	35	36	33	33	35	17
CNAL3	65	55	45	36	45	45	43	50	47	47	47	47	49	49	47	47	46	46	47	26
CNAL4	65	55	45	35	44	44	42	50	47	47	47	47	48	48	47	47	46	46	47	26
CNAL5	65	55	45	28	30	29	27	41	41	41	41	41	41	41	41	41	41	41	41	12
CNAL6	65	55	45	32	32	31	33	41	42	42	42	41	42	42	41	41	41	40	41	14
CNAL7	65	55	45	30	32	32	33	40	41	41	41	41	41	41	40	40	40	40	40	15



- 13.8.4 Whilst the BS 5228 Category A threshold values are not exceeded, mitigation in the form of good practice during construction is recommended to keep noise to a minimum and recommendations in accordance with BS 5228. Therefore, during the construction of the Proposed Development there would be **no significant effects**.

Construction Traffic Noise

Stage 1 – Scoping Assessment

- 13.8.5 The Stage 1 scoping assessment determines which roads need to be assessed through noise propagation modelling and which roads will experience negligible noise effects for two scenarios, the additional construction traffic vehicle movements from the busiest months (worst case scenario), and the average across all months (average case scenario). It compares the 2029 future baseline average vehicle movements from 07:00 -19:00 with the 'Total Traffic Flow', which is the 2029 baseline numbers plus the additional vehicle movements per working day from the Proposed Development.
- 13.8.6 **Table 13-10** details the anticipated vehicle flow in the busiest months/average across all months, and the percentage increase above the predicted baseline.

Table 13-10: Traffic Flow Data - Stage 1 Scoping Assessment

Traffic Count Location/ Link	2029	Vehicle Movement (Busiest Months)		Vehicle Movement (Average Monthly)	
	Baseline	Baseline + Development	Increase (%)	Baseline + Development	Increase (%)
B818 between Proposed Development and Fankerton	238	421	77%	321	35%
B818 between Fankerton and A872	2147	2330	9%	2,230	4%
A872 between B818 and Stirling Street	3844	3905	2%	3872	1%
A872 Stirling Street in Denny	6655	6716	1%	6683	0%
A872 between B818 and Denny Eastern Access Road	5600	5722	2%	5655	1%

- 13.8.7 One road segment has been identified as having an increase in road traffic during the construction period of more than 25%, the B818 between the Proposed Development and Fankerton. This road is indicated in black on **Figure 13.4: Construction Traffic (Stage 1)**. As such, this road has been identified for consideration as part of the Stage 2 Simple Assessment.
- 13.8.8 For the remaining assessment roads, also shown on **Figure 13.4: Construction Traffic (Stage 1)**, the traffic noise levels would increase by less than 1 dB and



therefore the road traffic noise effects are negligible, and no further assessment is required.

Stage 2 – Simple Assessment

- 13.8.9 Noise levels from the Total Traffic Flow for assessment roads and other roads in the study area where traffic flow data is available, for example the M80, have been calculated in accordance with CRTN and DMRB. **Figure 13.5: Construction Traffic – Worst Case (A), Figure 13.6: Construction Traffic – Worst Case (B), Figure 13.7: Construction Traffic – Average Case (A), and Figure 13.8: Construction Traffic – Average Case (B)** detail the noise contour plots for the assessment roads for both worst case and average case scenarios. Note that A and B split the road section of each scenario for ease of viewing.
- 13.8.10 A 50 m study around the B818 between Proposed Development and Fankerton assessment road (henceforth referred to as ‘Assessment Road’) has been defined and all residential NSRs located within these study areas identified, however, the noise contours (which are shown in 5 dB bands), indicate that some properties outside of the 50 m buffer may experience levels above 55 dBA, therefore, these have also been included in the assessment.
- 13.8.11 On each of the contour plots the boundary between the orange and grey areas indicates the 55 dBA line. Accordingly, areas that are orange or red indicate noise levels in excess of the DMRB LOAEL value of 55 dB LA10(18hours).
- 13.8.12 It can be seen on the figures that there are multiple properties along the road where noise levels, for both scenarios, exceed 55 dB LA10(18hours) and these are located at close proximity to the road.
- 13.8.13 Both scenarios include properties where noise levels exceed the DMRB LOAEL value of 55 dB LA10(18hours), therefore a Stage 3 Detailed Assessment is required.

Stage 3 – Detailed Assessment

- 13.8.14 The Stage 3 Detailed Assessment requires an Initial Assessment of Operational Noise Significance to be carried out to determine the magnitude of change by comparing the Do Minimum and Do Something noise levels. This is detailed in **Figure 13.5: Construction Traffic – Worst Case (A), Figure 13.6: Construction Traffic – Worst Case (B), Figure 13.7: Construction Traffic – Average Case (A), and Figure 13.8: Construction Traffic – Average Case (B)**, where the change in noise level per NSR is indicated with a coloured circle:
- Green indicates a change in noise level of less than 1 dB (negligible);
 - Orange indicates a change in noise level of 1 dB to 2.9 dB (minor);
 - Red indicates a change in noise level of 3 dB to 4.9 dB (moderate); and
 - Blue indicates a change in noise level greater than or equal to 5 dB (major).
- 13.8.15 No NSRs have been identified with a change in noise level equal to or above 5 dB (major) for the average case scenario.
- 13.8.16 **Figure 13.6: Construction Traffic – Worst Case (B)** depicts that the majority of NSRs are subject to a magnitude of change that is moderate, with one NSR indicating a major magnitude of change. In **Figure 13.5: Construction Traffic – Worst Case (A)**, there is an increase in the number of NSRs indicating a major magnitude of change, likely due to the increasing distance from the M80, and three NSRs indicating moderate.



- 13.8.17 In **Figure 13.7: Construction Traffic – Average Case (A)**, there are no NSRs indicating a major magnitude of change or above, with a roughly equal split of moderate and minor change in noise levels. **Figure 13.8: Construction Traffic – Average Case (B)** has no case of magnitude of change above minor, and a few NSRs that experience a negligible change.
- 13.8.18 To determine the Final Operational Significance on Noise Sensitive Buildings it is necessary to consider the context, which may change the initial findings.
- 13.8.19 Although a limited number of NSRs are predicted to experience a major magnitude of change during the worst-case scenario, the resulting road traffic noise levels remain below the SOAEL of 65 dB LA10(18hours) defined within DMRB. Consequently, while the relative increase in noise may be notable, the absolute noise environment would remain below the threshold at which significant adverse effects are generally considered likely.
- 13.8.20 Further consideration can also be made to the fact that construction road traffic impacts will only be temporary; the assessment period considers a 16-month construction period, compared to the DMRB standard assessment which is for a 15-year period. The construction traffic effects would therefore be limited to a short-term period and would cease entirely upon completion of construction activities.
- 13.8.21 Furthermore, the assessment of the worst-case scenario of road traffic noise is inherently conservative, as it considers levels of peak traffic flow during the months 5 and 6, when traffic flows are at their highest. These elevated levels would occur for a limited period of time and are not representative of the typical construction-phase conditions.
- 13.8.22 For both scenarios, construction working hours would be expected to be 07:00 to 19:00 Monday to Friday and 07:00 to 16:00 on Saturdays. However, for the purposes of this assessment, all the construction-related vehicle movements have been concentrated into the period 07:00 to 19:00 Monday to Friday. As such the report values are higher than expected. The DMRB/CRTN assessment metric is based on a 18 hour period from 06:00 – 24:00, but the Proposed Development traffic flow will only occur during the daytime, and no significant traffic flow from the Proposed Development is expected during the night-time. The resulting assessment is therefore conservative and is likely to overestimate the exposure.
- 13.8.23 For all identified NSRs with a major magnitude of change, this would only occur on days during peak traffic flow, which would be limited to a window of a couple months. For the average case scenario, the magnitude of change would be moderate or less.
- 13.8.24 With due regard to **Table 13-5** and the contextual elements described, the assessment concludes that the likely significant effect from construction traffic noise is **Not Significant** for all NSRs.

Operational Noise

Setting the TNAC (Stage 1)

- 13.8.25 As detailed in Section 6.5 of **Technical Appendix 13.2**, based on the predicted noise levels from 3rd party schemes being within 10 dB of predicted noise levels from the Proposed Development at NALs 1 – 8, and within 10 dB of the TNAC, a cumulative noise assessment is required at NALs 1-8. The TNAC have been established for each of these NALs and are presented in **Table 13-11** and **Table 13-12**.



13.8.26 The TNAC are based on a LLV of 40 dB for the daytime, and 43 dB for the night-time. For financially involved NALs, the TNAC have been established based on a LLV of 45 dBA (daytime and night-time).

Predicting the likely effects from cumulative (Stage 2)

The predicted cumulative noise levels were compared to the TNAC, as shown in **Table 13-11** and **Table 13-12**.



Table 13-11: TNAC Compliance Table – Likely Cumulative Noise – Daytime

Noise Assessment Location (NAL)		Wind Speed (ms ⁻¹) as standardised to 10 m height									
		1	2	3	4	5	6	7	8	9	10
NAL1 - Glendales Farmhouse	TNAC LA90	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
	Cumulative Predictions LA90	-	-	-	-	-	35.7	36.9	37.3	37.3	37.4
	Exceedance Level	-	-	-	-	-	-4.3	-3.1	-2.7	-2.7	-2.6
NAL2 - Reservoir Keepers House	TNAC LA90	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
	Cumulative Predictions LA90	-	-	-	-	-	32.9	34.4	34.7	34.8	34.8
	Exceedance Level	-	-	-	-	-	-7.1	-5.6	-5.3	-5.2	-5.2
NAL3 – Cairnoch Farm	TNAC LA90	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0
	Cumulative Predictions LA90	-	-	-	-	-	34.3	36.0	36.2	36.2	36.2
	Exceedance Level	-	-	-	-	-	-10.7	-9.0	-8.8	-8.8	-8.8
NAL4 - Cairnoch Bothy	TNAC LA90	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0
	Cumulative Predictions LA90	-	-	-	-	-	34.4	36.1	36.2	36.3	36.3
	Exceedance Level	-	-	-	-	-	-10.6	-8.9	-8.8	-8.7	-8.7



Noise Assessment Location (NAL)		Wind Speed (ms ⁻¹) as standardised to 10 m height									
		1	2	3	4	5	6	7	8	9	10
NAL5 - Gartcarron Fintry	TNAC LA90	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
	Cumulative Predictions LA90	-	-	-	-	-	35.2	36.3	36.5	36.7	36.8
	Exceedance Level	-	-	-	-	-	-4.8	-3.7	-3.5	-3.3	-3.2
NAL6 - Todholes	TNAC LA90	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
	Cumulative Predictions LA90	-	-	-	-	-	35.9	36.9	37.2	37.3	37.4
	Exceedance Level	-	-	-	-	-	-4.1	-3.1	-2.8	-2.7	-2.6
NAL7 – Cairnoch Lodge	TNAC LA90	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0
	Cumulative Predictions LA90	-	-	-	-	-	39.1	40.3	40.7	40.8	40.9
	Exceedance Level	-	-	-	-	-	-5.9	-4.7	-4.3	-4.2	-4.1
NAL8 – Easter Cringate	TNAC LA90	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0
	Cumulative Predictions LA90	-	-	-	-	-	39.1	40.2	40.6	40.7	40.8
	Exceedance Level	-	-	-	-	-	-5.9	-4.8	-4.4	-4.3	-4.2



Table 13-12: TNAC Compliance Table – Likely Cumulative Noise – Night-Time

Noise Assessment Location (NAL)		Wind Speed (ms ⁻¹) as standardised to 10 m height									
		1	2	3	4	5	6	7	8	9	10
NAL1 - Glendales Farmhouse	TNAC LA90	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
	Cumulative Predictions LA90	-	-	-	-	-	35.7	36.9	37.3	37.3	37.4
	Exceedance Level	-	-	-	-	-	-7.3	-6.1	-5.7	-5.7	-5.6
NAL2 - Reservoir Keepers House	TNAC LA90	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
	Cumulative Predictions LA90	-	-	-	-	-	32.9	34.4	34.7	34.8	34.8
	Exceedance Level	-	-	-	-	-	-10.1	-8.6	-8.3	-8.2	-8.2
NAL3 – Cairnoch Farm	TNAC LA90	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0
	Cumulative Predictions LA90	-	-	-	-	-	34.3	36	36.2	36.2	36.2
	Exceedance Level	-	-	-	-	-	-10.7	-9	-8.8	-8.8	-8.8
NAL4 - Cairnoch Bothy	TNAC LA90	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0
	Cumulative Predictions LA90	-	-	-	-	-	34.4	36.1	36.2	36.3	36.3
	Exceedance Level	-	-	-	-	-	-10.6	-8.9	-8.8	-8.7	-8.7



Noise Assessment Location (NAL)		Wind Speed (ms ⁻¹) as standardised to 10 m height									
		1	2	3	4	5	6	7	8	9	10
NAL5 - Gartcarron Fintry	TNAC LA90	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
	Cumulative Predictions LA90	-	-	-	-	-	35.2	36.3	36.5	36.7	36.8
	Exceedance Level	-	-	-	-	-	-7.8	-6.7	-6.5	-6.3	-6.2
NAL6 - Todholes	TNAC LA90	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
	Cumulative Predictions LA90	-	-	-	-	-	35.9	36.9	37.2	37.3	37.4
	Exceedance Level	-	-	-	-	-	-7.1	-6.1	-5.8	-5.7	-5.6
NAL7 – Cairnoch Lodge	TNAC LA90	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0
	Cumulative Predictions LA90	-	-	-	-	-	39.1	40.3	40.7	40.8	40.9
	Exceedance Level	-	-	-	-	-	-5.9	-4.7	-4.3	-4.2	-4.1
NAL8 - Easter Cringate	TNAC LA90	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0
	Cumulative Predictions LA90	-	-	-	-	-	39.1	40.2	40.6	40.7	40.8
	Exceedance Level	-	-	-	-	-	-5.9	-4.8	-4.4	-4.3	-4.2



- 13.8.27 The predicted cumulative turbine noise immission levels are below the TNAC under all conditions during both daytime and night-time periods for all NALs. As such, cumulative operational noise is **Not Significant**.

Operational phase – derivation of site specific noise limits for the Proposed Development (Stage 3)

- 13.8.28 To ensure the cumulative operation of all wind turbines would continue to meet the TNAC, each wind farm should operate within its own, SSNL. The SSNL for the Proposed Development have been derived with due regard to the apportionment options of the TNAC that are provided in the IOA GPG and ARWTN, as summarised in Table 6.8 of **Technical Appendix 13.2**.
- 13.8.29 The SSNL and noise predictions for the Proposed Development on its own, based on a candidate wind turbine of the Vestas V162 7.2 MW with a hub height of 99m, are summarised in **Table 13.13** and **Table 13.14**.



Table 13.13: Site Specific Noise Limit Compliance Table – Daytime

Noise Assessment Location (NAL)		Wind Speed (ms ⁻¹) as standardised to 10 m height									
		1	2	3	4	5	6	7	8	9	10
NAL1 - Glendales Farmhouse	Site Specific Noise Limit LA90	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
	Predictions LA90	-	-	17.7	19.2	22.4	25.9	28.0	28.0	28.0	28.0
	Exceedance Level	-	-	-12.3	-10.8	-7.6	-4.1	-2.0	-2.0	-2.0	-2.0
NAL2 - Reservoir Keepers House	Site Specific Noise Limit LA90	33.2	33.2	33.2	33.2	33.2	33.2	33.2	33.2	33.2	33.2
	Predictions LA90	-	-	19.9	21.4	24.6	28.1	30.2	30.2	30.2	30.2
	Exceedance Level	-	-	-13.3	-11.8	-8.6	-5.1	-3.0	-3.0	-3.0	-3.0
NAL3 – Cairnoch Farm	Site Specific Noise Limit LA90	37.3	37.3	37.3	37.3	37.3	37.3	37.3	37.3	37.3	37.3
	Predictions LA90	-	-	24.0	25.5	28.7	32.2	34.3	34.3	34.3	34.3
	Exceedance Level	-	-	-13.3	-11.8	-8.6	-5.1	-3.0	-3.0	-3.0	-3.0
NAL4 – Cairnoch Bothy	Site Specific Noise Limit LA90	37.3	37.3	37.3	37.3	37.3	37.3	37.3	37.3	37.3	37.3
	Predictions LA90	-	-	24.0	25.5	28.7	32.2	34.3	34.3	34.3	34.3
	Exceedance Level	-	-	-13.3	-11.8	-8.6	-5.1	-3.0	-3.0	-3.0	-3.0



Noise Assessment Location (NAL)		Wind Speed (ms ⁻¹) as standardised to 10 m height									
		1	2	3	4	5	6	7	8	9	10
NAL5 – Gartcarron Fintry	Site Specific Noise Limit LA90	32.4	32.4	32.4	32.4	32.4	32.4	32.4	32.4	32.4	32.4
	Predictions LA90	-	-	19.1	20.6	23.8	27.3	29.4	29.4	29.4	29.4
	Exceedance Level	-	-	-13.3	-11.8	-8.6	-5.1	-3.0	-3.0	-3.0	-3.0
NAL6 - Todholes	Site Specific Noise Limit LA90	32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5
	Predictions LA90	-	-	19.2	20.7	23.9	27.4	29.5	29.5	29.5	29.5
	Exceedance Level	-	-	-13.3	-11.8	-8.6	-5.1	-3.0	-3.0	-3.0	-3.0
NAL7 – Cairnoch Lodge	Site Specific Noise Limit LA90	39.9	39.9	39.9	39.9	39.9	39.9	39.9	39.9	39.9	39.9
	Predictions LA90	-	-	26.6	28.1	31.3	34.8	36.9	36.9	36.9	36.9
	Exceedance Level	-	-	-13.3	-11.8	-8.6	-5.1	-3.0	-3.0	-3.0	-3.0
NAL8 - Easter Cringate	Site Specific Noise Limit LA90	38.8	38.8	38.8	38.8	38.8	38.8	38.8	38.8	38.8	38.8
	Predicted Wind Turbine Noise LA90	-	-	25.5	27.0	30.2	33.7	35.8	35.8	35.8	35.8
	Exceedance Level	-	-	-13.3	-11.8	-8.6	-5.1	-3.0	-3.0	-3.0	-3.0



Noise Assessment Location (NAL)		Wind Speed (ms ⁻¹) as standardised to 10 m height									
		1	2	3	4	5	6	7	8	9	10
NAL9 – Easter Cringate Cottage	Site Specific Noise Limit LA90	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0
	Predicted Wind Turbine Noise LA90	-	-	20.0	21.5	24.7	28.2	30.3	30.3	30.3	30.3
	Exceedance Level	-	-	-15.0	-13.5	-10.3	-6.8	-4.7	-4.7	-4.7	-4.7
NAL10 – Earlsburn Cottage	Site Specific Noise Limit LA90	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
	Predicted Wind Turbine Noise LA90	-	-	17.7	19.2	22.4	25.9	28.0	28.0	28.0	28.0
	Exceedance Level	-	-	-12.3	-10.8	-7.6	-4.1	-2.0	-2.0	-2.0	-2.0
NAL11 - Ryecroft	Site Specific Noise Limit LA90	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
	Predicted Wind Turbine Noise LA90	-	-	16.6	18.1	21.3	24.8	26.9	26.9	26.9	26.9
	Exceedance Level	-	-	-13.4	-11.9	-8.7	-5.2	-3.1	-3.1	-3.1	-3.1



Table 13.14: Site Specific Noise Limit Compliance Table – Night-Time

Noise Assessment Location (NAL)		Wind Speed (ms ⁻¹) as standardised to 10 m height									
		1	2	3	4	5	6	7	8	9	10
NAL1 - Glendales Farmhouse	Site Specific Noise Limit LA90	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0
	Predictions LA90	-	-	17.7	19.2	22.4	25.9	28.0	28.0	28.0	28.0
	Exceedance Level	-	-	-15.3	-13.8	-10.6	-7.1	-5.0	-5.0	-5.0	-5.0
NAL2 - Reservoir Keepers House	Site Specific Noise Limit LA90	33.2	33.2	33.2	33.2	33.2	33.2	33.2	33.2	33.2	33.2
	Predictions LA90	-	-	19.9	21.4	24.6	28.1	30.2	30.2	30.2	30.2
	Exceedance Level	-	-	-13.3	-11.8	-8.6	-5.1	-3.0	-3.0	-3.0	-3.0
NAL3 – Cairnoch Farm	Site Specific Noise Limit LA90	37.3	37.3	37.3	37.3	37.3	37.3	37.3	37.3	37.3	37.3
	Predictions LA90	-	-	24.0	25.5	28.7	32.2	34.3	34.3	34.3	34.3
	Exceedance Level	-	-	-13.3	-11.8	-8.6	-5.1	-3.0	-3.0	-3.0	-3.0
NAL4 – Cairnoch Bothy	Site Specific Noise Limit LA90	37.3	37.3	37.3	37.3	37.3	37.3	37.3	37.3	37.3	37.3
	Predictions LA90	-	-	24.0	25.5	28.7	32.2	34.3	34.3	34.3	34.3
	Exceedance Level	-	-	-13.3	-11.8	-8.6	-5.1	-3.0	-3.0	-3.0	-3.0



Noise Assessment Location (NAL)		Wind Speed (ms ⁻¹) as standardised to 10 m height									
		1	2	3	4	5	6	7	8	9	10
NAL5 – Gartcarron Fintry	Site Specific Noise Limit LA90	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0
	Predictions LA90	-	-	19.1	20.6	23.8	27.3	29.4	29.4	29.4	29.4
	Exceedance Level	-	-	-13.9	-12.4	-9.2	-5.7	-3.6	-3.6	-3.6	-3.6
NAL6 - Todholes	Site Specific Noise Limit LA90	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0
	Predictions LA90	-	-	19.2	20.7	23.9	27.4	29.5	29.5	29.5	29.5
	Exceedance Level	-	-	-13.8	-12.3	-9.1	-5.6	-3.5	-3.5	-3.5	-3.5
NAL7 – Cairnoch Lodge	Site Specific Noise Limit LA90	39.9	39.9	39.9	39.9	39.9	39.9	39.9	39.9	39.9	39.9
	Predictions LA90	-	-	26.6	28.1	31.3	34.8	36.9	36.9	36.9	36.9
	Exceedance Level	-	-	-13.3	-11.8	-8.6	-5.1	-3.0	-3.0	-3.0	-3.0
NAL8 - Easter Cringate	Site Specific Noise Limit LA90	38.8	38.8	38.8	38.8	38.8	38.8	38.8	38.8	38.8	38.8
	Predicted Wind Turbine Noise LA90	-	-	25.5	27.0	30.2	33.7	35.8	35.8	35.8	35.8
	Exceedance Level	-	-	-13.3	-11.8	-8.6	-5.1	-3.0	-3.0	-3.0	-3.0



Noise Assessment Location (NAL)		Wind Speed (ms ⁻¹) as standardised to 10 m height									
		1	2	3	4	5	6	7	8	9	10
NAL9 – Easter Cringate Cottage	Site Specific Noise Limit LA90	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0
	Predicted Wind Turbine Noise LA90	-	-	20.0	21.5	24.7	28.2	30.3	30.3	30.3	30.3
	Exceedance Level	-	-	-15.0	-13.5	-10.3	-6.8	-4.7	-4.7	-4.7	-4.7
NAL10 – Earlsburn Cottage	Site Specific Noise Limit LA90	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0
	Predicted Wind Turbine Noise LA90	-	-	17.7	19.2	22.4	25.9	28.0	28.0	28.0	28.0
	Exceedance Level	-	-	-15.3	-13.8	-10.6	-7.1	-5.0	-5.0	-5.0	-5.0
NAL11 - Ryecroft	Site Specific Noise Limit LA90	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0
	Predicted Wind Turbine Noise LA90	-	-	16.6	18.1	21.3	24.8	26.9	26.9	26.9	26.9
	Exceedance Level	-	-	-16.4	-14.9	-11.7	-8.2	-6.1	-6.1	-6.1	-6.1



- 13.8.30 The results show that the predicted wind turbine noise levels from the Proposed Development operating on its own meet the SSNL under all conditions at all NALs during the daytime and night-time. As such, operational noise is **Not Significant**.

13.9 Additional Mitigation and Enhancement

- 13.9.1 As there are no significant effects associated with construction noise, construction traffic noise, and operational noise from the Proposed Development, additional mitigation beyond good construction practice measures is not required.
- 13.9.2 Should blasting be required to establish the borrow pit, it will be designed such that vibration levels at the nearest NSR's would not exceed the guideline limits presented in BS 7385-2: 1993 'The Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration' and BS 6472-2: 2008 'Guide to evaluation of human exposure to vibration in buildings. Blast-induced vibration'.

13.10 Residual Effects

Construction

- 13.10.1 Elements of construction noise may be audible at the closest residential receptors for certain periods during the construction phases. However, with or without the good practice construction mitigation measures outlined above, there would be **no significant residual effects from construction noise**.
- 13.10.2 Therefore, construction noise is **Not Significant**.

Construction Traffic

- 13.10.3 The change in noise levels from construction traffic may be noticeable at the closest residential receptors for certain periods during the construction phases. However, due to the temporary nature of the noise, and limited exposure to daytime periods, there would be no significant residual effects from construction traffic noise.
- 13.10.4 Therefore, construction traffic noise is **Not Significant**.

Operation

- 13.10.5 The results of the noise assessment show that the predicted wind turbine noise levels would meet the SSNL under all conditions and at all locations for both daytime and night-time periods. As such, no additional mitigation is required and there would be **no significant residual effects from operational noise**.
- 13.10.6 At some locations, under some wind conditions and for a certain proportion of the time operational wind farm noise could be audible; however, it would be at an acceptable level in relation to the ARWTN guidelines.
- 13.10.7 Therefore, operational noise is **Not Significant**.

13.11 Cumulative Assessment

Construction

- 13.11.1 It is noted that the construction period could overlap with that of the consented Earlsburn Extension, or the proposed Drummarnock Wind Farms, which are located to the north and north east of the Proposed Development, respectively.



- 13.11.2 Sound pressure levels add together logarithmically, and where two noise sources have noise levels that are more than 10 dB apart, no noise level increase will occur as a result of both sources operating together. For example; 40 dB + 30 dB = 40 dB.
- 13.11.3 Therefore, when considering the potential for cumulative noise effects, it is important to consider whether the noise levels from multiple developments are likely to be within or greater than 10 dB of each other at any given receptor.
- 13.11.4 In the unlikely event that the worst case construction noise levels from the Proposed Development be within 10 dB of the construction noise levels from Earlsburn Extension, or Drummarnock Wind Farms, the margin between the predicted construction noise levels due to the Proposed Development and the BS 5228 Daytime threshold value is such that the Proposed Development would not contribute significantly to any exceedance of the value that would indicate a significant effect. As such, cumulative construction noise is **Not Significant**.

Construction Traffic

- 13.11.5 A cumulative construction noise assessment has not been undertaken as the construction period is not expected to overlap with any other significant construction activities in the vicinity. As such cumulative construction traffic noise is **Not Significant**.

Operation

- 13.11.6 The results of the likely cumulative operational wind farm noise assessment show that the Proposed Development can operate concurrently with all other operational, consented, and proposed developments in the area, whilst meeting the TNAC at all NALs. As such, cumulative operational noise is **Not Significant**.

13.12 Summary and Statement of Significance

- 13.12.1 Predicted construction noise levels compared with the Category criteria outlined in Section E.3.2 of BS 5228: Part 1 2009+A1:2014 indicate that construction noise levels are below the guideline levels considered acceptable at all residential receptors across the construction timeline and therefore the construction noise effects are **Not Significant**.
- 13.12.2 Whilst the change in noise levels from construction traffic may be noticeable at the closest residential receptors for certain periods during the construction phases, due to the temporary nature of the noise, and limited exposure to daytime periods, the construction traffic noise effects are **Not Significant**.
- 13.12.3 The guidance contained within ARWTN was used to assess the likely operational noise impact of the Proposed Development. Predicted levels indicate that for dwellings neighbouring the Proposed Development, wind turbine noise would meet the noise criteria established in accordance with ARWTN, therefore the operational noise effects are **Not Significant**.
- 13.12.4 There are a range of wind turbine models that would be appropriate for the Proposed Development. The candidate wind turbine used for this assessment was chosen in order to allow a representative assessment of the noise impacts. Should the Proposed Development receive consent, the final choice of wind turbine would be subject to a competitive tendering process. The final choice of wind turbine would, however, have to meet the noise limits determined and contained within any condition imposed.



Table 13-15: Summary Table

Description of Effect	Mitigation/Enhancement Measure(s)	Significance of Residual Effect	
		Level and Significance	Beneficial/ Adverse
During Construction & Decommissioning			
Impacts at noise sensitive receptors from noise generated from the construction of Proposed Development	No specific measures required other than standard good practice during construction.	Not Significant	N/A
Impacts at noise sensitive receptors due to construction traffic	Implementation of Heavy Goods Vehicle route restrictions through a Construction Traffic Management Plan. No other specific additional measures required.	Not Significant	N/A
During Operation			
Impacts at noise sensitive receptors from noise generated from the operation of Proposed Development (Wind Turbines)	Optimisation of the number and locations of turbines during the design process. No other specific additional measures required.	Not Significant	N/A
Cumulative Effects			
Potential cumulative construction noise effects on noise sensitive receptors.	No specific additional measures required.	Not Significant	N/A
Potential cumulative operational noise effects on noise sensitive receptors.	No specific additional measures required.	Not Significant	N/A



13.13 References

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13.14 Abbreviations List

Abbreviation	Meaning
AM	Amplitude Modulation
ARWTN	Assessment and Rating of Wind Turbine Noise
BS	British Standard
CNAL	Construction Noise Assessment Location
dB	Decibels
ECU	Energy Consents Unit
EHO	Environmental Health Officer
EIA	Environmental Impact Assessment
LLV	Lower Limiting Value
GPG	Good Practice Guide
Hz	Hertz
IOA	Institute of Acoustics
LFN	Low Frequency Noise
NAL	Noise Assessment Location
NML	Noise Monitoring Location
NSR	Noise Sensitive Receptor
SC	Stirling Council
SSNL	Site Specific Noise Limit
STE	Serrated Trailing Edge
TNAC	Total Noise Assessment Criteria



Making Sustainability Happen



Chapter 14: Aviation

Environmental Impact Assessment Report

Cairnoch Hill Wind Farm

3 August 2026



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Revision	Prepared By	Checked By	Approved By	Description
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14.0 Aviation

14.1 Introduction

- 14.1.1 This chapter assesses the potential for the proposed Cairnoch Hill Wind Farm (“the Proposed Development”) to affect aviation Communications, Navigational and Surveillance (CNS) infrastructure. The study has included a review of the location, technical characteristics and operational activities and aviation facilities in the area and an examination of the potential effects of the Proposed Development.
- 14.1.2 The potential effects of wind turbines on aviation operations and infrastructure have been widely publicised. There are two main likely scenarios that may lead to an objection from aviation stakeholders:
- Wind turbines can present as a physical obstruction at, or close, to an aerodrome and other aviation activities such as civil and military low flying operations; and
 - Impacts on aviation CNS systems and the provision of a radar-based Air Traffic Service (ATS). Un-demanded returns from wind turbines presenting as radar clutter on radar displays can affect the Air Traffic Control Officer’s (ATCO) ability to differentiate between real aircraft and those false returns resulting from the detection of wind turbines. Furthermore, the presence of multiple false targets in close proximity can lead to the generation of false radar tracks creating further difficulty in identifying the true aircraft position.
- 14.1.3 The main concern is one of any potential effect on aviation safety and which, if left unmitigated, those effects will persist for the lifetime of the Proposed Development.
- 14.1.4 This assessment considers whether the Proposed Development is likely to have any effect on the following;
- Civil aviation interests including “En Route” facilities managed and operated by National Air Traffic Services (NATS) 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.
- 14.1.5 The assessment has been undertaken in accordance with relevant policy, legislation and guidance as standard for similar development proposals in this area.
- 14.1.6 An appraisal of the Proposed Development’s compliance with relevant policy is given in the separate, standalone **Planning Statement** provided as part of the planning application.

14.2 Consultation

- 14.2.1 Consultation undertaken prior to and during the EIA Scoping stage has been described in the EIA Scoping Report.
- 14.2.2 Consultation with relevant bodies during the EIA process is summarised in **Table 14-1**.



Table 14-1: Summary of Consultation

Consultation Details	Consultee Comments	Applicant Response
Met Office	Following an initial Aviation Baseline Assessment the Met Office were consulted to address any concerns on radar line of sight to the Holehead Met radar (email WFAS /Met Office 31 May 2024 et al)	Further design iterations were undertaken, in concert with the Met Office, to relocate the wind turbines and to reduce the tip heights below the affected radar beam. The Met Office have confirmed that they would have no objection to the Proposed Development layout (email 23 April 2025). The layout has, subsequently, been subject to some changes, most notably T4 has moved to the north and on higher ground. The Met Office have confirmed that the new position and tip height should be below the radar beam (email 23 June 2026).
Defence Infrastructure Organisation (DIO)	DIO letter (11 October 2024) highlights the MoD concerns on the turbines represent a physical obstruction to low flying.	The design layout incorporates MoD compliant infra-red aviation lighting.
NATS	NATS Technical and Operational Assessment ("TOPA") highlights the predicted impact on the NATS Lowther Hill and Kincardine radars.	It is probable that mitigation on the Lowther hill radar should be available utilising the additional radars' coverage should be available. Consultation will continue with NATS on suitable mitigation to address any radar impacts and with a view to agreeing a Planning Condition on technical mitigation. (Paragraph 14.7.9 refers.)
Glasgow Airport	Glasgow Airport letter (16 October 2024) highlighting the possible need for an Instrument Flight Procedures (IFP) assessment.	Consultation will continue on any requirement for IFP assessments.
Cumbernauld Airport	The Scoping Opinion notes that Cumbernauld Airport suggests that they are likely to raise an objection to the Proposed Development due to the affect the development could have on aircraft operating to and from the airport, which consist primarily of light aircraft and helicopters. This was based on concerns raised by a commercial entity at Cumbernauld airport having submitted a letter detailing how they consider that the wind turbines would become an obstacle to flying in the local area. (Letter, Cormack Aircraft Services Ltd, dated 5 September 2024.)	It is considered that there was no obligation to consult Cumbernauld Airport as the Site is outwith the stipulated 4km consultation for an aerodrome of this nature and with the extant runway length at Cumbernauld, as detailed in CAP 764. Nonetheless Stirling Council did consult with Cumbernauld Airport when preparing their Scoping Opinion and as such we have provided a response in relation to this. There would be no effect on operations at the airport. The Site is outside of the Air Traffic Zone surrounding the airport and outside



Consultation Details	Consultee Comments	Applicant Response
		of the stipulated consultation distance. Furthermore, the extent to which any vertical obstacle can become an en-route obstacle/navigational hazard is a matter for the CAA. The wind turbines would be lit in accordance with both CAA and MoD lighting requirements which will mitigate any such effect.

14.3 Assessment Methodology and Significance Criteria

- 14.3.1 The generic project-wide approach to the assessment methodology is set out in **Chapter 5: Environmental Impact Assessment**. However, whilst this has informed the general approach used in this assessment, standard aviation industry guidance has been taken into consideration for this assessment. The methodology used to identify the aviation stakeholders as well as to assess the potential effects of the Proposed Development on the sensitive aviation receptors is summarised below.
- 14.3.2 The assessment took into account the aviation consultation, regulatory, safeguarding and operational requirements as laid down in a number of civil and military publications and regulations as detailed in the list of references in section 14.11.
- 14.3.3 The following points set out in CAP 764 at paragraph 3.6 are highlighted, which note that wind farm developments within the following areas may impact upon civil aerodrome related operations:
- Unless otherwise specified by the aerodrome or indicated on the aerodrome's published wind turbine consultation map, within 30km of an aerodrome with a surveillance system facility. The distance can be far greater than 30km depending upon a number of factors including the type and coverage of the surveillance system and the particular operation at the aerodrome;
 - 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 as specified in CAP 764;
 - Further assessment and/or consultation will be required if turbines are planned within:
 - 17km of a licensed aerodrome within a runway of 1,100m or more;
 - 5km of a licensed aerodrome with a runway of less than 1,100m;
 - 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.
- 14.3.4 CAP 764 goes on to state that these distances are for guidance purposes only and do not represent ranges beyond which all wind turbine developments will be approved or within which they will always be objected to. These ranges are intended as a prompt for further discussion between developers and aviation stakeholders.
- 14.3.5 As well as examining the technical impact of wind turbines on ATC facilities, it is also necessary to consider the physical safeguarding of ATC operations using the



criteria laid down in CAP 168 to determine whether a proposed development will breach obstacle clearance criteria.

14.3.6 It is necessary to take into account the aviation and air defence activities of the MoD. The issues that will be assessed include the likely significant effect of the Proposed Development on;

- MoD Airfields, both radar and non-radar equipped;
- MoD remote ATC radars;
- MoD Air Defence Radars;
- Military Aviation Authority Aerodrome Design and Safeguarding; and
- Military Low Flying.

14.3.7 It is also required to consider the air traffic control operations of NATS and the data gathering radars of the Met Office.

Study Area

14.3.8 In addition to the requirements of the extant legislation detailed in sections 14.3.3 to 14.3.6, the study area was determined by the maximum range of any radar that had the subsequent capability of surveying the airspace above the Proposed Development as shown on **Image A**.

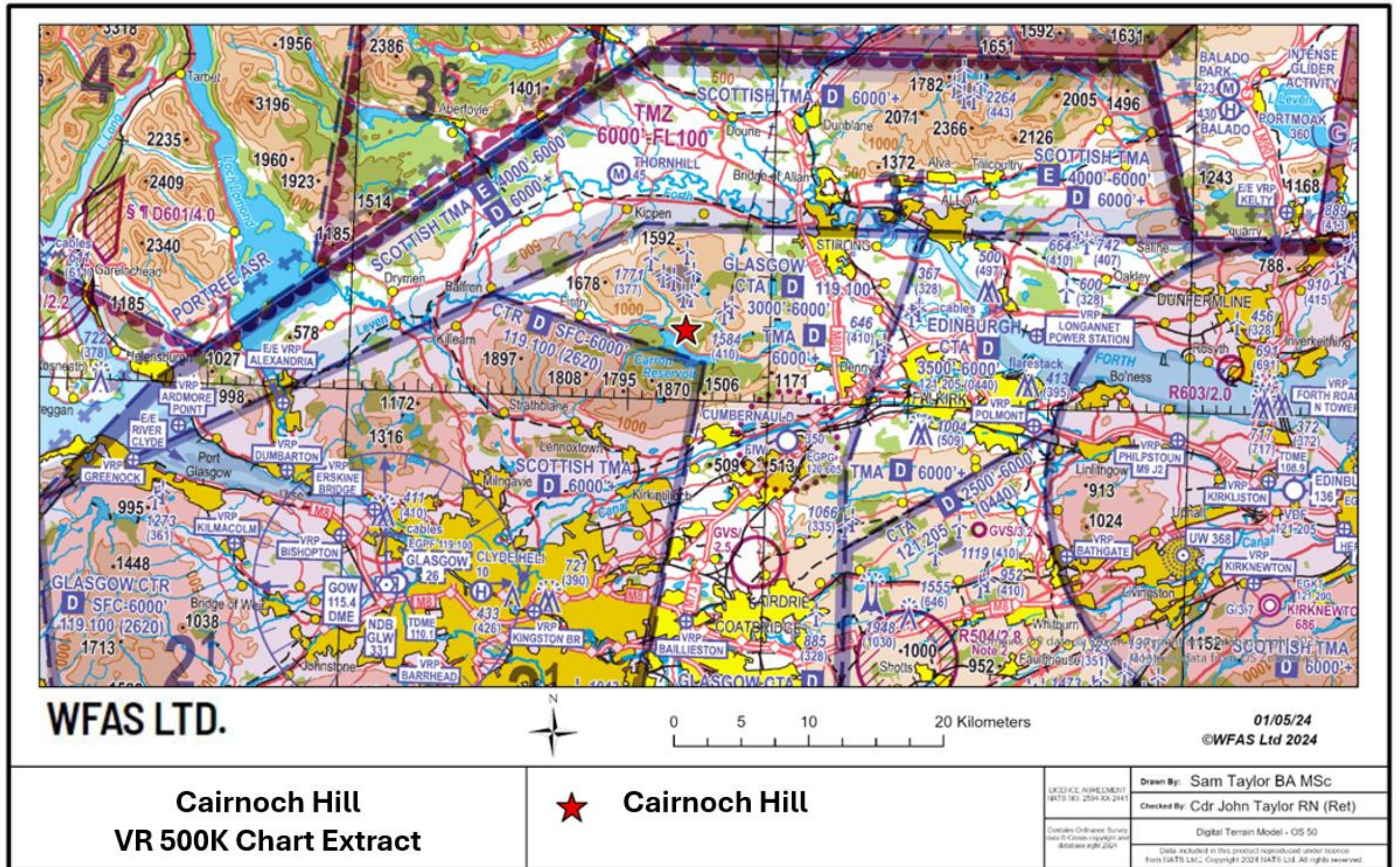


Image A – Aviation Study Area



Desk Study

- 14.3.9 The effects of the Proposed Development on air traffic control radars were evaluated by determining whether the wind turbines would be within line-of-sight of any such radar facilities and whether the development site is in an area of operational importance to those radar operators. Potential effects on other aviation interests were evaluated by considering the consultation responses from aviation stakeholders in the context of the likelihood of identified aviation operators using the airspace in the vicinity of the Proposed Development and the requirements for obstacle clearance.

Radar Modelling and Analysis Information

- 14.3.10 The Radar Line-of-Sight (RLoS) analysis is a limited and theoretical desk-based study. In reality there are variable levels of signal diffraction and attenuation within a given radar environment that can influence the probability of a wind turbine being detected by a particular radar. The analysis is designed to give an indication of the likelihood of the wind turbine being detected, such that the operational significance of the wind farm relative to nearby aviation stakeholders can be assessed.
- 14.3.11 The receptors selected as relevant to the assessment of effects, including radar were based upon an initial desktop screening exercise and reflect the relevant guidance and regulation. Each receptor has been considered and scoped in or out on the basis of effect–receptor pathway, professional knowledge, data confidence and the temporal and spatial scales involved. There are no limitations in the completion of the assessment, however line-of-sight conclusions are based on theoretical modelling results.
- 14.3.12 Radar modelling has been undertaken using the “RView” system which utilises a comprehensive systems database incorporating the safeguarding criteria for a wide range of radar and radio navigation systems. RView models terrain using the latest Ordnance Survey (OS) Terrain 50 digital terrain model, which has a post spacing of 50m and has a root mean square (RMS) error of 4m. 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. If needed, RView is also capable of modelling a range of atmospheric refractive conditions. RView models the trajectory of radar signals at different elevations enabling 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.

Assessment of Potential Effect Level and Significance

- 14.3.13 The general approach to wind farm development is to avoid effects on infrastructure where possible, and to find appropriate technical mitigation solutions where this cannot be achieved. These solutions should be agreed between the developer and the infrastructure owner/operator, and discussions will often continue through the planning process. On implementation of an appropriate technical solution, wind farm developments will have a negligible effect or no effect on existing infrastructure. Following this approach, it is inappropriate to apply significance criteria to these effects, as the mitigated effect will be either no effect, or a negligible effect, which should be deemed to be acceptable to the relevant infrastructure operator.



Assessment of Residual Effect Level and Significance

- 14.3.14 With the application of mitigation for any potential aviation effects on the NATS radar infrastructure and with agreed CAA and MoD lighting there should be no residual technical or operational effects.

Limitations to Assessment

- 14.3.15 There are no limitations in the completion of the assessment, however LoS conclusions are based on theoretical modelling results.

14.4 Baseline Conditions

- 14.4.1 Identification of baseline aviation facilities was conducted using our extensive database of aviation infrastructure in the UK and the following information sources;
- UK Aeronautical Information Publications (military and civil);
 - The Ministry of Defence list of safeguarded sites; and
 - National Air Traffic Services safeguarding maps.
- 14.4.2 In aviation considerations, airspace over the UK is classified in accordance with International Civil Aviation Organisation (ICAO) standards from A to G (there is no airspace designated as Class B or Class F in UK airspace). Airspace Classes A, C, D and E are variants of Controlled Airspace (CAS) in which generically aircraft require an ATC clearance to operate within. Class G Airspace is airspace in which aircraft can operate without any clearance required or being in contact with ATC.
- 14.4.3 The Proposed Development is located in Class G airspace, in an area that is utilised by both military and civil aviation activity but is also within the coverage range of both civil and military radars. In this Class G unregulated airspace, whilst it is advisable for aircraft to be in receipt of an ATC service, it is not a regulatory requirement and aircraft can operate in this area autonomously under the visual flight rules (VFR).
- 14.4.4 NATS are the main UK ATS provider of air traffic services within civil aviation, utilising a network of long-range Primary Surveillance Radars (PSR) and Secondary Surveillance Radar (SSR)¹ systems positioned to provide maximum coverage of UK airspace. Additionally, NATS has a licence obligation to provide radar data to other remote aviation stakeholders (such as the Ministry of Defence (MoD)) to the required civil and Defence performance standards. In the airspace in the vicinity of the Proposed Development, NATS currently utilises data from a series of radars including the Lowther Hill PSR, the Cumbernauld PSR and the Kincardine PSR systems to support their provision of navigational services to flights into and out of Edinburgh, Glasgow, and Glasgow Prestwick airports, aircraft operating between UK airports and mainland Europe and also to those overflying the UK Flight Information Region (FIR).
- 14.4.5 The military UK Low Flying System (UKLFS) covers the open airspace of the whole UK and surrounding overseas areas from surface to 2,000 ft agl or amsl. Consequently, the addition of significant physical obstructions into the low-level environment has the potential to influence military low-flying training. However, the MoD does permit a degree of wind energy development in these areas subject to lighting requirements.

¹ SSR differs from PSR systems in that it transmits an interrogation requesting a dedicated response rather than relying on reflected energy.



Future Baseline in Absence of Proposed Development

- 14.4.6 With mitigation of the anticipated effects, and on the basis of available information, no changes are envisaged to the future aviation baseline.

14.5 Embedded and Standard Mitigation

- 14.5.1 Embedded mitigation includes the extensive consultation with the Met Office to ensure wind turbine positioning and tip height which minimises any effects on the Holehead Met Office radar.
- 14.5.2 To facilitate safe flight, day or night, there are regulations governing the procedures that must be followed to ensure the timely dissemination of information regarding the construction of anemometer masts and wind turbines. Information regarding any such construction must be passed to the Defence Geographical Centre (DGC) and the General Aviation Awareness Council (GAAC) in advance of the commencement of turbine construction and then be updated regarding location, height and lighting type. Information will then be promulgated within the civil UK Integrated Aeronautical Information Package (UK IAIP), the main resource for information for all of the UK airspace, as well as the Military Aeronautical Information Publications. Furthermore, the guidance on the use of cranes is contained within CAP 1096. Essentially, cranes are considered as another tall object but are subject to separate requirements due to the fact that they can move. Notification of the erection and operation of any crane is to be made to the CAA, in advance of the commencement of any construction and before any crane erection begins, detailing position, height, and required lighting etc. With this mitigation applied, the potential effects of construction activities on aviation receptors would be appropriately managed, and no likely significant effects are predicted during the construction phase.
- 14.5.3 The Site is in an area where the MoD anticipates the construction of wind turbines is a concern due to a potential effect on military Low Flying operations. In order to safeguard general use of the area by military aircraft during operation, the Applicant confirms that the Proposed Development turbines would be fitted with MoD accredited aviation safety lighting. This can be implemented under a suitably worded planning condition.
- 14.5.4 NATS are concerned regarding the potential effects of the Proposed Development on their radar network in the area. Mitigation should be able to be implemented and subject to a planning condition.

14.6 Scope of Assessment

- 14.6.1 **Table 14-2** provides a summary of which receptors and impacts have been scoped in or out of the assessment.

Table 14-2: Summary of Assessment Scope

Receptor/Impact	Scoped In?		Comments
	Construction	Operation	
Holehead Met radar	No	Yes	It should be expected that the Met Office may request a Planning Condition to reflect prior consultation
MoD ATC radars	No	Yes	Radar modelling demonstrates that there should be no MoD ATC radars affected by the Proposed



Receptor/Impact	Scoped In?		Comments
	Construction	Operation	
			Development. This will need to be confirmed with DIO.
MoD Air Defence Radars	No	Yes	Radar modelling demonstrates that there should be no MoD Air Defence Radars affected by the Proposed Development. This will need to be confirmed with DIO.
MoD Low Flying	No	Yes	An aviation lighting scheme has been designed and has been submitted to the CAA (see TA 14.1) for approval, after which it will be submitted to the MoD, which includes infra-red aviation lighting as suitable mitigation for any concerns on low flying. This will need to be confirmed with DIO.
NATS	No	Yes	Consultation will continue with NATS on the radars utilised within the Multi-Radar Tracking System covering the Scottish Terminal Manoeuvring Area and on any need for radar mitigation,
Glasgow International Airport	No	Yes	Radar modelling demonstrates that there will be no LoS between the Proposed Development and the airport radars. Consultation will continue with Glasgow International Airport regarding any potential effects on their procedures.
Edinburgh International Airport	No	Yes	Consultation will continue with Edinburgh International Airport regarding any potential effects on their radars or procedures.
Non-radar equipped licensed airports	No	No	There are no non-radar equipped licensed aerodromes within the stipulated consultation distance.
Unlicensed airports.	No	No	There are no unlicensed aerodromes, hang-gliding sites or glider sites within the stipulated consultation distances.

Decommissioning

14.6.2 As described in **Chapter 3: Description of the Development**, effects associated with the construction phase can be considered to be representative of reasonable worst-case decommissioning effects, therefore no separate assessment of the decommissioning phase is presented in this chapter.

14.7 Assessment of Potentially Significant Effects

14.7.1 To determine the potential effects of the Proposed Development on aviation operations, the sensitivity of a receptor was considered in relation to the magnitude



of effect. Significance criteria for aviation impacts are typically difficult to establish; there is no standard definition, and they are not strictly based on the sensitivity of the receptor or magnitude of change but on whether the industry regulations for technical safeguarding, safe obstacle avoidance or radar separation (from radar clutter) can be maintained in the presence of wind turbines. Any anticipated impact upon aviation stakeholders which results in restricted operations will be considered to be of significance, but it is down to the affected stakeholder as to whether any effect is significant on their operations or not.

- 14.7.2 In this sense aviation does not conform to normal EIA significance assessment techniques or criterion.

Construction

- 14.7.3 The fact that any tall object can represent a vertical obstacle to flight and, potentially, pose a flight safety risk is self-evident.
- 14.7.4 During construction, and prior to testing/commissioning, the wind turbine blades will not be rotating; there will be no prospect of any wind turbines, either assembled or being assembled, of being detected by any radar and presented on to controllers' radar display screens on any radar. There will be no radar impacts during the construction phase.
- 14.7.5 Depending on their position in relation to airports/airfields the magnitude of the effect of turbines as a vertical obstruction to aircraft can be significant when assessed against the flight profiles of civil and military aircraft in the area. To facilitate safe flight, day or night, there are regulations governing the procedures that must be followed to ensure the timely dissemination of information regarding the construction of anemometer masts and wind turbines. Information regarding any such construction must be passed to the Defence Geographical Centre (DGC) and the General Aviation Awareness Council (GAAC) in advance of the commencement of turbine construction and then be updated regarding location, height and lighting type. Information will then be promulgated within the civil UK Integrated Aeronautical Information Package (UK IAP), the main resource for information for all of the UK airspace, as well as the Military Aeronautical Information Publications. Furthermore, the guidance on the use of cranes is contained within CAP 1096. Essentially, cranes are considered as another tall object but are subject to separate requirements due to the fact that they can move. Notification of the erection and operation of any crane is to be made to the CAA in advance of the commencement of any crane erection, detailing position, height, lighting etc.
- 14.7.6 With mitigation by informing the aviation community of the ongoing work, and the subsequent charting of the turbines, the effect during construction will be Negligible and there will be no residual effect.

Operation

- 14.7.7 The operational wind turbines of the Proposed Development would be theoretically detectable by the NATS Lowther Hill PSR. Wind turbines detectable by an aviation radar surveillance system might degrade the system by creating false targets, reduce system sensitivity, create radar shadowing behind the wind turbines and saturate the radar receiver leading to clutter potentially concealing real aircraft targets.
- 14.7.8 Air Traffic Controllers are responsible for maintaining typically five nautical miles (Nm) lateral separation between aircraft and unknown radar targets including those that may be result of radar detection of operational wind turbines. Where turbines are detectable by a PSR system, they may appear as aircraft targets and could



mask genuine aircraft responses. The radar may also be de-sensitised by clutter processing within the sector containing turbines, meaning that real aircraft targets may not be detected or may disappear from radar. At the anticipated maximum heights the radar LoS analysis indicates that, theoretically, the turbines will be highly likely to be detectable by the Lowther Hill PSR. This is predicted to create clutter to be presented on NATS displays utilising the radar.

- 14.7.9 It is predicted that the impact will affect the receptor directly, which is vulnerable to this effect. All aviation radar stakeholders aim to ensure 'clutter free' radar to continue to deliver a safe and effective air traffic service. The Applicant will continue to engage with NATS prior to and during the application process and will continue this engagement and seek to identify and agree mitigation for the Lowther Hill PSR system. On the basis that suitable mitigation will be agreed with NATS, the effect created by the Proposed Development would be Negligible.

14.8 Residual Effects

Construction

- 14.8.1 The construction of the Proposed Development would create a physical obstruction to flight operations in the vicinity of the wind turbines. Construction infrastructure, such as cranes, can be difficult to see from the air, particularly in poor meteorological conditions, leading to potential increased obstacle collision risk.
- 14.8.2 Pilots are obliged to plan their flying activities in advance and to be familiar with any enroute obstacles they may encounter; however, during flight, weather conditions or operational requirements may necessitate route adjustments. In Visual Meteorological Conditions (VMC)² pilots are ultimately responsible for seeing and avoiding obstructions such as wind turbines and would be aware through notification of construction activities. Furthermore, when flying in Instrumental Meteorological Conditions (IMC)³ in the vicinity of the construction area, pilots qualified to do so, would be flying above the Minimum Sector Altitude (MSA)⁴ to ensure avoidance of vertical obstacles.
- 14.8.3 Embedded mitigation measures, in the form of appropriate notification to aviation stakeholders of the extent of the Proposed Development, the maximum height of obstructions, the operational period and timings of any maintenance activity, together with the lighting and marking of infrastructure, would minimise effects to aviation flight operations. These measures would comply with current guidelines and be agreed with the appropriate stakeholders. The ability of aviation receptors to continue to operate safely remains as the obstacles are marked, lit and notified. Dependent on specific weather conditions, aircraft may be required to alter tracks or climb to avoid the area.
- 14.8.4 With compliance with the mandated procedure for notification of vertical construction activities to aviation stakeholders there should be no residual effects during construction.
- 14.8.5 The construction of the Proposed Development would have no significant effect on the PSR systems. Within the radar algorithms the static nature of the infrastructure

² VMC: A flight category which allows flight to be conducted under visual flight rules defined by in flight visibility and clearance from cloud.

³ IMC: Weather conditions which would preclude flight by the visual flight rules, i.e., conditions where the aircraft is in, or close to cloud or flying in visibility less than a specified minimum.

⁴ MSA: Under aviation flight rules, the altitude below which it is unsafe to fly in IMC owing to presence of terrain or obstacles within a specified area.



is such that it would not be processed and presented onto ATC display screens by the PSR systems. Potential static radar returns would be removed through use of inherent radar system filtering techniques and static returns would not be displayed on the radar display screens.

Operation

- 14.8.6 There is the potential for the turbines to create interference on the NATS radar infrastructure and on the Edinburgh Airport radars which could result in clutter on the controllers' radar screens and involve vectoring aircraft clear of the presented interference. With mitigation those effects should be removed and there should be no residual radar effects during the operational phase.
- 14.8.7 The Proposed Development would be located within LFA 16 which is considered by the MoD to be an area of importance for low flying training. While the proliferation of turbines within LFA 16 is a general concern for the MoD regarding military Low Flying operations in this region, they have not objected but have expressed concerns regarding the presence of the turbines as a physical obstruction to low flying.
- 14.8.8 The lighting layout planned for the Proposed Development will include MoD infra-red lighting and this will be presented to the MoD for approval. Additionally, the turbines would be annotated on aviation charts of the area.
- 14.8.9 With these mitigating measures in place there should be no residual effect on low flying as a result of the Proposed Development during the operational phase.

14.9 Cumulative Assessment

- 14.9.1 There are a number of existing and proposed wind farms, including the Proposed Development, which are located in areas where they may be detectable to the Edinburgh and NATS PSRs. Without mitigation, the Proposed Development could add to any cumulative effect on the radars in combination with these other projects, in terms of the area affected by radar clutter. With mitigation the effects of the Proposed Development would be removed, and the Proposed Development cannot contribute to any cumulative effects. Discussions will continue with the affected stakeholders regarding potential mitigation measures to form the basis of a Planning Condition to be agreed with NATS.
- 14.9.2 While the proliferation of turbines within LFA 16 is a general concern for the MoD regarding military Low Flying operations in this region, they have not objected. Subject to the MoD lighting requirements, no adverse cumulative effects are predicted as a result of the Proposed Development.

14.10 Summary and Statement of Significance

- 14.10.1 With the embedded mitigation measures outlined within this EIA Report and based on the progress of discussions and agreements made to date with stakeholders, post-mitigation effects as a result of the Proposed Development are predicted to be **not significant** for all aviation stakeholders.



Table 14-3: Summary Table

Description of Effect	Mitigation/Enhancement Measure(s)	Significance of Residual Effect	
		Level and Significance	Beneficial / Adverse
During Construction & Decommissioning			
Operation of cranes and utilisation of vertical construction infrastructure.	Promulgation of construction activities in accordance with the mandated notification procedures.	Negligible (Not Significant)	Adverse
During Operation			
The wind turbines will represent a potential physical obstruction to military low flying.	The proposed lighting layout includes infra-red lighting to MoD specification.	Negligible (Not Significant) with mitigation implemented.	Adverse
RLoS will result in the potential for interference on the NATS controllers' screens.	Consultation will continue on the suitability of technical mitigation.	Negligible (Not Significant) with mitigation implemented.	Adverse
RLoS will result in the potential for interference on the Edinburgh Airport controllers' screens.	Consultation will continue on the suitability of technical mitigation.	Negligible (Not Significant) with mitigation implemented.	Adverse
The wind turbines may have an effect on the procedures at Glasgow Airport.	If required an IFP assessment will be conducted to determine if alterations are required to the airport procedures. If changes to airport procedures are needed then such changes are anticipated to be feasible and could be implemented.	Negligible (Not Significant) with mitigation implemented.	Adverse
Cumulative Effects			
Not Applicable	Not Applicable	Not Applicable	Not Applicable



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14.12 Abbreviations List

Abbreviation	Meaning
ADR	Air Defence Radar
AGL	Above Ground Level
AIP	Aeronautical Information Publication
AMSL	Above Mean Sea Level
ATC	Air Traffic Control
ATCO	Air Traffic Control Officer
ATS	Air Traffic Service
ATZ	Aerodrome Traffic Zone
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication
CAS	Controlled Airspace
Cdr	Commander
CNS	Communication, Navigation and Surveillance
CTA	Control Area
DGC	Defence Geographic Centre
DIO	Defence Infrastructure Organisation
FIR	Flight Information Region
GAAC	General Aviation Awareness Council
GIA	Glasgow International Airport
HIAL	Highlands and Islands Airports
ICAO	International Civil Aviation Organisation
IFP	Instrument Flight Procedure
IMC	Instrument Meteorological Conditions
Km	Kilometre
LFA	Low Flying Area
LoS	Line-of-sight
MAA	Military Aviation Authority
MATZ	Military Air Traffic Zones
MoD	Ministry of Defence
MSA	Minimum Sector Altitude
MSD	Minimum Separation Distance



Abbreviation	Meaning
MRTS	Multi-Radar Tracking System
NATS	National Air Traffic Services
NERL	NATS En Route Ltd
Nm	Nautical Mile
OS	Ordnance Survey
PSR	Primary Surveillance Radar
RAF	Royal Air Force
Retd	Retired
RLoS	Radar Line-of-Sight
RMS	Root Mean Square
RN	Royal Navy
SRTM	Shuttle Radar Topography Mission
SSR	Secondary Surveillance Radar
UK	United Kingdom
UKLFS	UK Low Flying System
UK IAIP	UK Integrated Aeronautical Information Package
VFR	Visual Flight Rules
WFAS	Wind Farm Aviation Safeguarding Ltd.
WTG	Wind Turbine Generator



Making Sustainability Happen



Chapter 15: Other Issues

Environmental Impact Assessment Report

Cairnoch Hill Wind Farm

3 August 2026



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15.0 Other Issues

15.1 Introduction

- 15.1.1 This chapter assesses the potential effects of the proposed Cairnoch Hill Wind Farm ("the Proposed Development") in relation to:
- Shadow Flicker;
 - Climate and Carbon Balance;
 - Risk of Accidents and Other Disasters;
 - Population and Human Health;
 - Air Quality;
 - Telecommunications and Television Reception; and
 - Waste and Environmental Management.
- 15.1.2 Elements relating to major accidents and disasters have also been addressed in the individual technical discipline chapters where relevant.
- 15.1.3 Impacts on population and human health have also been addressed in the individual technical discipline chapters where relevant.
- 15.1.4 This assessment has been undertaken by SLR Consulting.
- 15.1.5 The chapter is supported by the following Figures and Technical Appendices, which are referenced in the text where appropriate:
- **Figure 15.1: Shadow Flicker Study Area;**
 - **Figure 15.2: Shadow Flicker Results;**
 - **Figure 15.3: Cumulative Shadow Flicker Study Area;**
 - **Technical Appendix 15.1: Carbon Balance Assessment;** and
 - **Technical Appendix 15.2: Outline Access Management Plan.**

15.2 Shadow Flicker

Introduction

- 15.2.1 This section of the chapter summarises the potential effect of shadow flicker associated with the Proposed Development.
- 15.2.2 Under certain conditions, as the sun passes behind the rotors of a wind turbine and casts a shadow over neighbouring properties, as the blades rotate, the shadow that is cast may appear to flick on and off. This phenomenon is known as shadow flicker.

Policy and Guidelines

- 15.2.3 The following policy and guidance documents have been referred to in undertaking the assessment:
- Scottish Government - National Planning Framework 4 (NPF4) (2023);
 - Scottish Government - Onshore wind policy statement 2022 (and its predecessor Onshore wind turbines: planning advice, now formally withdrawn although remains relevant);
 - Stirling Council's Wind Energy Developments Supplementary Guidance (2019);



- Northern Ireland, Planning Policy Statement 18: Renewable Energy (2009); and
- Department of Energy & Climate Change (DECC) - Update of UK Shadow Flicker evidence base (2011).

Consultation

- 15.2.4 Consultation was undertaken through the EIA scoping process, with a scoping request submitted in September 2024. There were no specific requests relating to the shadow flicker assessment provided in the scoping opinion, so it has been assumed that the proposed approach was acceptable to all consultees.

Assessment Methodology and Significance Criteria

Study Area

- 15.2.5 The update of UK Shadow Flicker Evidence Base (2011), published by the then Department of Energy and Climate Change (DECC) (now the Department for Energy Security and Net Zero) reviewed international legislation relating to the assessment of shadow flicker for wind turbine development. It states that assessing shadow flicker effects within 10 times the rotor diameter of wind turbines has been widely accepted across different European countries and is deemed to be an appropriate area. It also states that shadow flicker effects on receptors in the UK are generally restricted to the area within 130 degrees either side of north from the wind turbine and out to 10 rotor diameters, based on a review of policy and guidance in place at the time the document was written.
- 15.2.6 The DECC study concluded that there have not been extensive issues with shadow flicker in the UK and, in circumstances where the potential for significant shadow flicker issues effects have been identified, these have been resolved using standard mitigation.
- 15.2.7 Whilst acknowledging that the Scottish Government's Onshore wind turbines: planning advice (2014) document was withdrawn in December 2025, its description of the effect known as shadow flicker remains valid. It states that:
- 15.2.8 *"Under certain combinations of geographical position, time of day and time of year, the sun may pass behind the rotor and cast a shadow over neighbouring properties. When the blades rotate, the shadow flicks on and off; the effect is known as 'shadow flicker'. It occurs only within buildings where the flicker appears through a narrow window opening. The seasonal duration of this effect can be calculated from the geometry of the machine and the latitude of the potential site.*
- 15.2.9 *Where this could be a problem, developers should provide calculations to quantify the effect. In most cases however, where separation is provided between wind turbines and nearby dwellings (as a general rule, 10 rotor diameters), 'shadow flicker' should not be a problem. However, there is scope to vary layout/reduce the height of turbines in extreme cases"*
- 15.2.10 Neither NPF4 or the Scottish Government's Onshore Wind Policy Statement (2022) contain technical details regarding the assessment of shadow flicker. NPF4 Policy 11 (e) i) states that *"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"*.
- 15.2.11 Stirling Council's Wind Energy Developments Supplementary Guidance states at paragraph 5.36 with respect to Shadow Flicker:



- 15.2.12 *“Developers will be required to ensure that location, scale, layout and design of proposals will not lead to unacceptable impacts on residential properties as a result of flickering light interference patterns generated by low morning and evening sunlight passing through rotating turbine blades.”*
- 15.2.13 There is also no applicable legislation setting out any relevant rules or requirements for the assessment or control of shadow flicker.
- 15.2.14 The assessment was therefore carried out based on a Study Area of 10 rotor diameters for the candidate wind turbine Vestas V162 (plus 50m micro-siting) giving an overall Study Area of 1,670m from the proposed wind turbines¹ (See **Figure 15.1**).
- 15.2.15 Shadow flicker effects are only considered during the operational phase of a wind farm development, and do not occur if the wind turbines are not rotating or if the sun is not shining.

Assessment Methodology

- 15.2.16 The shadow flicker assessment comprises numerical modelling of the proposed turbines and receptors within the defined Study Area. It is noted that whilst there are a number of computer models available, the DECC study (2011) confirms that there are limited differences between outputs of the various packages. For shadow flicker assessments, SLR Consulting uses one of the industry standard software packages, ReSoft Wind Farm software (version 5.1.2.1).
- 15.2.17 The calculations from this assessment process assumes a worst-case scenario based on the sun shining during all daylight hours over the course of a year, no obscuring features (such as trees, hedges, other buildings) being present, the face of the rotor always being aligned towards the dwelling, and that the rotor is always turning (i.e. the wind is always blowing between 4m/s and 25m/s, and no account is taken of shut down periods for maintenance). This methodology yields a theoretical maximum indication of potential shadow flicker incidence, together with the times of day, and dates during the year when potential incidence may occur.
- 15.2.18 The levels of shadow flicker at each receptor have been calculated based on a ‘greenhouse’ modelling approach, where the full length of each façade of a building is modelled as a window (and is therefore sensitive to shadow flicker). Each modelled window is assumed to have a mid-point height of 3m. This approach has been taken in order to present a worst-case estimate of shadow flicker, in the absence of any detailed window location data. In reality, only the glazed area of each façade would be sensitive to shadow flicker effects, therefore modelling the full façade will result in higher predicted levels than will actually be possible.
- 15.2.19 The software performs calculations to determine the position of the sun throughout the year, and thus during what times of day it will theoretically cast a shadow across the windows of nearby houses within the defined Study Area (plus 50m micro-siting). Data input into the model where shadow flicker assessment is required is as follows:
- The locations of all properties within 1,670m of the proposed wind turbine locations;
 - The dimensions and orientations of windows facing the Proposed Development – for the purpose of this model the full length of each façade of a building is

¹ Candidate wind turbine’s rotor diameter is 162m, 10*162 = 1,620m, plus 50m micro-siting = 1,670m.



modelled as a window (and is therefore sensitive to shadow flicker). Each modelled window is assumed to have a mid-point height of 3m;

- The surrounding topography (Ordnance Survey Digital Terrain Model); and
- The locations and dimensions of the proposed wind turbines.

15.2.20 The following sources of information, outlined in **Table 15-1**, were used to inform this assessment.

Table 15-1: Sources of Information

Topic	Sources of Information
Residential Properties Location in relation to the Proposed Development.	Ordnance Survey (OS) 1:25,000 Mapping AddressBase data.
Topography Height data	OS 5m Digital Terrain Model (DTM) data

15.2.21 In practice, it is likely that shadow flicker effects would occur for considerably less time than the worst-case predictions, for the following reasons:

- In the UK, sunshine typically occurs for approximately 30% of daylight hours. At other times, the wind turbines are unlikely to cast shadows sufficiently pronounced to cause shadow flicker effects to occur;
- At times when the wind turbine rotor is not oriented directly towards the property, the duration of shadow flicker effects would be reduced due to the elliptical shape of the shadow cast; and
- The assessment has been undertaken assuming a worst-case scenario which does not take into consideration the screening effect of anything located between the wind turbines (e.g., intervening structures or vegetation) and the property. The assessment also assumes that the property does have windows facing the wind turbines, which may not always be the case.

15.2.22 A “likely-case” scenario of shadow flicker effects has therefore also been included in the results section, based on the average sunshine hours experienced at the location of the Proposed Development (“the Site”).

15.2.23 Only those properties within 1,670m of the proposed wind turbines have been included in the calculations. The model has been run using OS terrain 5m DTM data which is the most accurate digital terrain data available for the Site.

Limitations to Assessment

15.2.24 There are several additional factors that can influence the amount of shadow flicker actually experienced and these cannot be readily included in a computer-based assessment.

15.2.25 Climatic conditions dictate that the sun is not always shining. The closest Met Office location is Stirling S Wks, located approximately 13.5km to the north east of the Proposed Development. Historic Met Office data (over the period 1991 - 2020) gives



- actual sunshine hours for the Stirling S Wks Met Station to be on average 29.2%² of total daylight hours. Cloud cover during other times may obscure the sun and prevent shadow flicker occurrence. While some shadows may be cast under slightly overcast conditions, no shadow at all would be cast when heavy cloud cover prevails.
- 15.2.26 During calm periods, or very high winds, the wind turbine blades would not rotate, and shadow flicker would not occur. Wind turbines would also be periodically shut down for maintenance or repair work.
- 15.2.27 Wind turbines automatically orientate themselves to face the prevailing wind direction. This means that the turbine rotors would not always face directly towards the occupied buildings. Under some wind conditions, the proposed wind turbines would face 'side-on' to properties, and in these conditions only a very small area of blade movement would be visible.
- 15.2.28 Any screening provided by vegetation or structures has not been incorporated as the analysis has been run on bare ground terrain data as a worst-case scenario.

Assessment of Potential Effect Significance

- 15.2.29 Whilst the time and duration of shadow flicker events can be predicted accurately, the level of the effect is difficult to quantify as this would depend on the location of windows within a property, the use of the rooms affected, the level of shading surrounding the property and how susceptible the receptor is to light flicker.
- 15.2.30 As confirmed by the DECC study (2011), there is no standard Scottish or English or Welsh guidance relating to a limit for shadow flicker, and this remains the case. The only guidance providing additional recommendations is the Northern Irish PPS 18 (2009) guidance which recommends that for properties within 500m of the wind turbines, shadow flicker should not exceed 30 hours per year, or 30 minutes per day.
- 15.2.31 The assessment has therefore adopted a criterion of 30 hours of shadow flicker (under the likely-case assessment scenario outlined previously) in one year as a significance threshold. Where less than 30 hours of shadow flicker is predicted to occur in one year at a particular property, this is considered to not require mitigation, in accordance with best practice guidance. Consideration is also given to the 30 minutes per day scenario, however, due to the limitations in assessment set out previously, this is harder to accurately predict on a daily basis and hence is not a key consideration in assessing the level of effect.
- 15.2.32 Whilst the distance between a turbine and a receptor does not affect the length of time shadow flicker would be experienced, the actual effect (i.e. the total exposure time and flicker intensity combined) of the Proposed Development would, in reality, be less than that calculated in the worst-case scenario. This is because the shadow flicker intensity will reduce as the distance increases between a turbine and a receptor. This reduction in intensity with distance is not accounted for within the model, or assessment.

² Average sunshine hours of 1,279.62 / total number of daylight hours 4,380 = 29.2%. Data from Met Office Climate Averages site available at: <https://www.metoffice.gov.uk/research/climate/maps-and-data/location-specific-long-term-averages/gcvpqb5sz>



Requirements for Mitigation

- 15.2.33 Mitigation will be proposed to minimise or remove predicted effects, if levels of shadow flicker are deemed to be significant in practice in line with the Northern Irish PPS 18 (2009) guidance.

Cumulative Assessment

- 15.2.34 There are eight wind energy developments within the vicinity of the Site (five operational, two consented, and one live application). However, as shown on **Figure 15.3**, none of the receptors identified within the Study Area for the Proposed Development would fall within any of the shadow flicker Study Areas for these nearby developments.
- 15.2.35 Therefore, there are no existing, or in planning wind farms located in the local area such that potential cumulative shadow flicker effects would be experienced, and cumulative effects relating to shadow flicker are not considered further.

Baseline Conditions

- 15.2.36 Five residential properties have been identified which fall within the 1,670m Study Area. These properties could theoretically be affected by shadow flicker from the Proposed Development (**Figure 15.1**). Details of the properties are shown in **Table 15-2**.

Table 15-2: Receptors within the Study Area

Property ID	Receptor Name	Easting	Northing	Distance to Nearest Turbine (m)
1	Cairnoch Bothy	269265	684503	1,417
2	Cairnoch Farm	269285	684488	1,415
3	18 Carron Valley	271623	683989	1,668
4	Cairnoch Lodge	270415	686808	1,239
5	Easter Cringate	270493	686893	1,354

Receptors Brought Forward for Assessment

- 15.2.37 All properties within the Study Area and identified in **Table 15-2** have been brought forward for assessment.

Potential Effects

Construction and Decommissioning

- 15.2.38 Shadow flicker is an operational effect and hence not considered during the construction or decommissioning phases.

Operation

- 15.2.39 **Figure 15.2** shows the likely predicted results of the shadow flicker modelling. The results, set out in **Table 15-3**, show both the 'worst-case scenario', which assumes that the sun is always shining during daylight hours, the wind is always blowing, makes no allowance for any screening by vegetation, and includes the potential for micro-siting leading to turbines being moved 50m closer to these properties, and also the likely case scenario, whereby the worst-case results are adjusted for likely annual sunshine hours.



- 15.2.40 Based on the predictive modelling technique outlined above, there is predicted to be the greatest shadow flicker effects of up to 54.2 hours per year at Receptor 4, assuming the worst-case scenario whereby the sun is always shining during daylight hours, the wind turbines are always turning, and there is no screening from vegetation. In the likely-case scenario this shadow flicker effect reduces to 15.8 hours per year. The only other receptor predicted to experience over 30 hours of shadow flicker annually under the worst-case scenario is Receptor 5 with 40.6 hours, falling to 11.8 hours under the likely case scenario. The remaining three receptors within the Study Area are not predicted to experience any shadow flicker effect from the Proposed Development.
- 15.2.41 Two receptors are predicted to experience over 30 minutes of shadow flicker in a day, assuming the worst-case scenario whereby the sun is always shining during daylight hours, however this would be exceeded by a maximum of 5 minutes in a day.



Table 15-3: Shadow Flicker Assessment Outputs from Computer Model

Receptor ID	Receptor Name	Theoretical Days per Year Shadow Flicker Experienced	Turbine(s) Causing Effect	Days of Year Theoretical Shadow Flicker could exceed 30 minutes	Maximum Theoretical Shadow Flicker Minutes Per Day	Worst-Case Shadow Flicker Hours Per Year	Likely Predicted Shadow Flicker Hours per Year*
1	Cairnoch Bothy	0	N/A	N/A	0	0	0
2	Cairnoch Farm	0	N/A	N/A	0	0	0
3	18 Carron Valley	0	N/A	N/A	0	0	0
4	Cairnoch Lodge	137	T1, T2, T3	23 Jan – 7 Feb; 25 Feb – 2 March; 11 - 16 Oct; 3 – 18 Nov (44 days)	35.7	54.2	15.8
5	Easter Cringate Farm	118	T1, T2, T3	24 Jan – 3 rd Feb; 7 – 17 Nov (22 days)	33.0	40.6	11.8
*based on average sunshine hours of 29.2% being applied to the model as outlined in Limitations to Assessment.							



Analysis of Results

Annual Impacts

- 15.2.42 The results show that of the five receptors assessed, two (Receptors 4 and 5) would be predicted to experience over 30 hours of shadow flicker effect per annum based on the worst-case assessment criteria.
- 15.2.43 Likely predicted hours of shadow flicker are provided in the final column of **Table 15-3**, adjusted for likely sunshine hours. Under these conservative assumptions, the annual hours of shadow flicker anticipated at all properties is under the 30 hours significance threshold.

Daily Impacts

- 15.2.44 The results show that under the worst-case assessment two receptors (Receptors 4 and 5) could experience more than 30 minutes of shadow flicker effect in a day. Column 5 in **Table 15-3** shows the number of days per year that each receptor could potentially experience more than 30 minutes of shadow flicker per day. Receptor 4 could experience a maximum of 35 minutes and 40 seconds, and Receptor 5 could experience a maximum of 33 minutes in a day.
- 15.2.45 As shown in **Table 15-3**, days where shadow flicker could potentially exceed 30 minutes are limited to the winter months, when average sunshine hours are at their lowest². Therefore, in reality, the daily shadow flicker impacts are likely to be significantly lower than predicted in the worst-case scenario.

Limitations to Assessment

- 15.2.46 Whilst the likely case scenario considers the average sunshine hours at the Site, the model does not take into account the proportion of time that the wind is not blowing to a sufficient level to rotate wind turbine blades, any screening provided by vegetation, or the true size and orientation of dwelling windows in the 'greenhouse' approach. Therefore, the modelled hours of shadow flicker represent a conservative assessment and, in reality, are likely to be even less than predicted.

Mitigation

- 15.2.47 Based on the significance threshold outlined previously, under the likely case scenario, shadow flicker effects requiring mitigation are not predicted to occur at any receptors as a result of the Proposed Development. However, the Applicant is committed to promptly investigating any complaints of shadow flicker and taking appropriate action as required, should a substantiated shadow flicker effect from the Proposed Development be confirmed.
- 15.2.48 The Applicant proposes that prior to the operation of the first wind turbine, a Wind Farm Shadow Flicker Protocol would be submitted to and approved by Stirling Council. This would set out the protocol to be followed should a shadow flicker complaint be received from a receptor within the Study Area, and potential mitigation measures should that complaint be upheld following investigation. Should a complaint be upheld, these mitigation measures would include programming the relevant wind turbine's shadow flicker control module to minimise impacts at the receptor(s). Operation of the Proposed Development would be undertaken in accordance with the Wind Farm Shadow Flicker Protocol.
- 15.2.49 If a complaint is made regarding shadow flicker, an investigation would take place which considers the weather conditions at the time of the alleged shadow flicker event, to determine which turbines were, or were not, creating the effect and the



- extent of the shadow flicker created. If the investigation confirms a loss of residential amenity at any location, the technical mitigation measures built into these turbines would be activated.
- 15.2.50 Shadow flicker control modules, consisting of light sensors and specialised software, would be installed on the turbines that can prevent operation during periods when shadow flicker can be experienced at nearby properties. The installation of a programmable shadow flicker module would allow the control of turbines in order to eliminate shadow flicker. The correct operation of the installed shadow flicker control measures would ensure that there would be no impact from shadow flicker. The operation and performance of the shadow flicker control measures would be monitored on an ongoing basis.
- 15.2.51 The shadow flicker control module consists of bespoke software, a clock, a timer, a switch, a wind direction sensor and a light sensor. The module can control a specific turbine (or turbines) which would be programmed to shut down on specific dates at specific times when the sun is bright enough, there is sufficient wind to rotate the blades, and the wind direction is such that nuisance shadow flicker could occur. There is no specific UK guidance regarding what level of light is sufficient to cause a shadow flicker event. However, the actual light level that would trigger a turbine shut down can be manually configured on Site, following installation, to reflect local conditions.
- 15.2.52 It is proposed that a planning condition, would provide an appropriate form of mitigation to ensure that any complaints would be investigated within a reasonable timescale and that the rectification of any substantiated shadow flicker issue would be implemented promptly and effectively. The DECC guidance (2011) states that *“Mitigation measures which have been employed to operational wind farms such as turbine shut down strategies, have proved very successful, to the extent that shadow flicker cannot be considered to be a major issue in the UK.”*

Residual Effects

- 15.2.53 Under the likely-case scenario, there would be no significant effects in relation to shadow flicker as a result of the Proposed Development. The mitigation commitments made by the Applicant would further ensure that **no significant residual effects** would occur in relation to shadow flicker on the identified receptors as a result of the Proposed Development.

Summary

- 15.2.54 The Proposed Development is predicted to cause shadow flicker effects in excess of 30 hours per year for two properties within the 1,670m Study Area under the worst-case scenario. When the likely-case scenario is applied, accounting for the average sunshine hours, shadow flicker effects in excess of 30 hours per year are not predicted to occur at any receptors within the shadow flicker Study Area.
- 15.2.55 Therefore, under the likely-case scenario, there would be **no significant effects** in relation to shadow flicker as a result of the Proposed Development.
- 15.2.56 Should a shadow flicker complaint be raised, mitigation can be provided, including shutting down individual wind turbines during periods when shadow flicker is modelled to occur and the climatic conditions are such that shadow flicker can be experienced.
- 15.2.57 A suitably worded planning condition would provide an appropriate form of mitigation to ensure that any complaints would be investigated within a reasonable timescale and that the rectification of any substantiated shadow flicker issue would be implemented promptly and effectively.



15.3 Climate and Carbon Balance

- 15.3.1 This section of the chapter details the calculations to work out carbon dioxide (“CO₂”) emissions from the Proposed Development. Consideration of potential lifecycle emissions for onshore renewable energy development in Scotland has tended to focus on wind energy, given that wind farms are often constructed on peatlands or in forestry, resulting in associated carbon emissions from excavation of peat and forestry felling.
- 15.3.2 In addition to generating electricity, the Scottish Government sees wind farms as an important mechanism for reducing the UK’s CO₂ emissions. This section estimates the CO₂ emissions associated with the manufacture and construction of the Proposed Development as well as estimating the contribution the Proposed Development would make to reducing CO₂ emissions, to give an estimate of the whole life carbon balance of the Proposed Development. The assessment is based on a detailed baseline description of the Proposed Development and its location. All calculations are based on site specific data, where available. Where site specific data is not available approved national/regional information has been used.
- 15.3.3 A standalone assessment on the vulnerability of the Proposed Development to climate change has not been included, as it is considered that none of the identified climate change trends would affect the Proposed Development, with the possible exception of increased windstorms. Mitigation with regards to extreme weather events, is detailed in paragraphs 15.4.10 - 15.4.13. The effects of climate change on environmental receptors has been considered in each of the relevant environmental topic chapters of this EIA Report (**Chapters 7 to 14**).
- 15.3.4 Each unit of wind generated electricity would displace a unit of conventionally generated electricity, therefore, saving power station emissions. **Table 15-4** provides a breakdown of the estimated emissions displaced per annum and over the assumed lifespan of 40 years for the Proposed Development.

Carbon and Peatland

- 15.3.5 Wind farms in upland areas tend to be sited on peatlands which hold stocks of carbon and so have the potential to release carbon into the atmosphere in the form of CO₂ if disturbed. The Proposed Development Site comprises mainly commercial forestry, however there are some localised areas of peat across the Site and therefore appropriate consideration of the carbon balance is required.
- 15.3.6 In order to minimise the requirement for the extraction of peat, the Site design process (described in **Chapter 2: Design Evolution and Alternatives**) has avoided infrastructure being located on areas of deeper peat (>1m). Peat probing was carried out onsite and peat depth mapped, as shown in **Figure 10.1.1 of Technical Appendix 10.1: Peat Landslide Hazard Risk Assessment**. This enabled wind turbines and associated infrastructure to be located in areas with no peat or shallower peat. This is considered to be mitigation which is ‘embedded’ in the design of the Proposed Development.
- 15.3.7 Paragraphs 15.3.17 to 15.3.22 detail how the whole life carbon balance assessment for wind farms on peatlands is calculated, including the input of emissions due to liberation of CO₂ from carbon stored in peat as a result of construction.

Characteristics of Peatland

- 15.3.8 The loss of carbon from the carbon fixing potential from plants and vegetation on peat land is small, but is calculated for the area from which peat is removed and the



- area affected by drainage. The carbon stored in the peat itself represents a much larger potential source of carbon loss.
- 15.3.9 When flooded, peat soils emit less carbon dioxide but more methane than when they are drained. In flooded soils, carbon emissions are usually exceeded by plant fixation, so the net exchange of carbon with the atmosphere is negative and soil stocks increase. When soils are aerated, carbon emissions usually exceed plant fixation, so the net exchange of carbon with the atmosphere is positive.
- 15.3.10 To calculate the carbon emissions attributable to the removal or drainage of the peat, emissions occurring if the soil had remained in situ and undrained are subtracted from the emissions occurring after removal or drainage.
- 15.3.11 The indirect loss of CO₂ uptake (fixation) by plants originally on the surface of the Site, but eliminated by construction activity including the destruction of active bog plants on wet sites and felling, is calculated on Site specific data collected as part of the EIA process and based on blanket bog.
- 15.3.12 Emissions due to the indirect, long term liberation of CO₂ from carbon stored in peat due to drying and oxidation processes caused by construction of the Site, can also be calculated from Site specific data for the Proposed Development. This figure is a worst-case scenario, as the peat would be reused onsite to minimise carbon losses.
- 15.3.13 Data from wind turbine manufacturers and the construction related activity is included as part of the assessment to address payback periods, however the two previous sources (from peat and the losses from loss of plant uptake) are a much more significant contributor to CO₂ emissions and the overall CO₂ debt where peat is disturbed onsite.

Carbon Emissions from Construction

- 15.3.14 Emissions arising from the fabrication of the turbines and the associated components are based on a full life analysis of a typical wind turbine and include CO₂ emissions resulting from transportation, erection, operation, dismantling and removal of wind turbines and foundations and transmission grid connection equipment from the existing electricity grid system.
- 15.3.15 With respect to turbines, emissions from material production are the dominant source of CO₂. Emissions arising from construction (including transportation of components, quarrying, building foundations, access tracks and hard standings) and commissioning are also included in the calculations. The assessment has used Nayak et al (2008) default values for 'turbine life' emissions, calculated with respect to installed capacity (**Technical Appendix 15.1: Carbon Balance Assessment**).
- 15.3.16 The Proposed Development is seeking consent for an operational lifespan of 40 years.

Methodology

- 15.3.17 In Scotland, applications submitted under Section 36 of the Electricity Act 1989 are required to undertake the carbon balance assessment using the Scottish Government's carbon calculator tool. Whilst the Proposed Development is not a Section 36 development, and therefore a carbon balance assessment is not a statutory requirement, the tool is still useful to determine the overall payback time and emissions savings due to the wind element of the Proposed Development. The Scottish Government's carbon calculator tool is currently offline (as of the finalisation of this chapter in July 2026). In the absence of the online Carbon Calculator Tool this assessment has been undertaken in accordance with the



associated guidance using the offline version spreadsheet provided by the Energy Consents Unit. The methodology to calculate carbon emissions generated in the construction, operation and decommissioning of a wind farm is based on 'Calculating carbon savings from windfarms on Scottish peat lands - A New Approach' (Nayak et al, 2008), prepared for the Scottish Government Science, Policy and Co-ordination Division. This was superseded in 2011 by the document 'Calculating Carbon Savings from Wind Farms on Scottish Peatlands - A New Approach', (Nayak et al, 2008 and 2010) and (Smith et al, 2011). In terms of carbon footprint, the aforementioned 'carbon calculator' is the Scottish Government's tool provided to support the process of determining the carbon impact of wind farm developments in Scotland.

Significance of Effects

- 15.3.18 All emissions contribute to climate change. Climate and the atmosphere is considered to have "*Very High*" sensitivity to changes in greenhouse gas emissions. This is due to the receptor having little or no ability to absorb change without fundamentally altering its present character, and it being of very high environmental value, and of international importance.
- 15.3.19 The magnitude of potential effects is identified through consideration of the Proposed Development, the degree of change to baseline conditions predicted as a result of the Proposed Development, the duration and reversibility of an effect and professional judgement (taking account of best practice guidance and legislation). The criteria for assessing the magnitude of an effect are presented in **Table 15-4**.

Table 15-4: Framework for Determining Magnitude of Effects

Magnitude of Effects	Definition
High	A fundamental change to the baseline condition of the asset, leading to total loss or major alteration of character.
Medium	A material, partial loss or alteration of character.
Low	A slight, detectable, alteration of the baseline condition of the asset.
Negligible	A barely distinguishable change from baseline conditions.

- 15.3.20 To determine whether effects are significant under the EIA Regulations, it is appropriate to consider the sensitivity (value and resilience) of the receptor and the magnitude of the effect, taking into account uncertainty. This is based on the professional judgement of the assessor and uses the matrix set out in **Table 15-5**.

Table 15-5: Significance Evaluation Matrix

		Magnitude of Effect			
Sensitivity		High	Medium	Low	Negligible
	Very High	Major (Significant)	Major (Significant)	Moderate (Probably Significant)	Minor (Not Significant)
	High	Major (Significant)	Moderate (Probably Significant)	Moderate (Probably Significant)	Minor (Not Significant)
	Medium	Moderate	Moderate	Minor (Not)	Negligible



Magnitude of Effect					
		(Probably Significant)	(Probably Significant)	Significant	
	Low	Moderate (Probably Significant)	Minor (Not Significant)	Negligible	Negligible

15.3.21 The categories of significance of effect are described in **Table 15-6**.

Table 15-6: Categories of Significance of Effect

Significance	Definition
Major	A fundamental change to location, environment, species, or sensitive receptor.
Moderate	A material, but non-fundamental change to a location, environment, species, or sensitive receptor.
Minor	A detectable but non-material change to a location, environment, species, or sensitive receptor.
Negligible	No detectable or material change to a location, environment, species or sensitive receptor.

15.3.22 Effects assessed can be either beneficial (positive) or adverse (negative).

Baseline Conditions

15.3.23 The State of the UK Climate 2025 (Kendon et al, 2026), provides the latest assessment of UK climate trends, variations and extremes based on the most up to date observations from the UK's network of weather stations. Some of the key findings are as follows:

- 2025 was the warmest year in the UK since 1884. The most recent decade, from 2016 to 2025, has been 0.51°C warmer than the period 1991 to 2020, and 1.33C warmer than 1961 to 1990;
- Over recent decades, temperature extremes have increased, becoming more frequent and intense. For example, the number of days over 30°C has more than quadrupled for Greater London for the most recent decade, 2016 to 2025, compared to 1961 to 1990;
- There were 297 marine heatwave days for North west European seas and the North east Atlantic in 2025, referenced to the 1991 to 2020 period, more than any other year since 1982;
- The winter half-year (October to March) for the most recent decade, 2016 to 2025, has been 3% wetter than the period from 1991 to 2020, and 13% wetter than the period from 1961 to 1990;
- 2025 was the sunniest year in the UK from 1910, and included the UK's sunniest spring; and
- Since 1901, the sea level around the UK has risen by about 20.1 cm, with two-thirds of this rise happening over the last three decades.



Greenhouse Gas Emissions and Renewable Energy

- 15.3.24 **Chapter 4: Renewable Energy and Planning Policy** of the EIA Report identifies the climate change, energy and planning legislation, policies and targets relevant to the Proposed Development.
- 15.3.25 **Chapter 4** summarises the international, UK and Scottish policies and targets relating to climate change and greenhouse gas emissions. All of these policies and targets acknowledge the severity of climate change and the requirement for the continued and increased adoption of renewable energy technologies, including onshore wind.

Input Parameters

- 15.3.26 To undertake this assessment the following parameters were considered, which encompass a full life cycle analysis of the Proposed Development. These parameters include:
- Emissions arising from fabrication of wind turbines and associated components;
 - Emissions arising from construction, (including transportation of components; Quarrying; building foundations, access tracks and hard standings; and commissioning);
 - The indirect loss of CO₂ uptake (fixation) by plants originally on surface of the Site but eliminated by construction activity (including the destruction of active bog plants on wet sites) and felling;
 - Emissions due to the indirect, long term liberation of CO₂ from carbon stored in peat due to drying and oxidation processes caused by construction; and
 - Loss of carbon due to drainage.
- 15.3.27 The offline spreadsheet version of the Scottish Government's carbon calculator tool provides generic values for CO₂ emissions associated with some components (such as wind turbine manufacture) and requires Site specific information for other components (such as habitat type, extent of peat disturbance and ground water levels). The calculation evaluates the balance of total carbon savings and carbon losses over the life of the Proposed Development. The potential carbon savings and carbon costs associated with wind farms are as follows:
- Carbon emission savings due to generation (based on displacing emissions from different power sources);
 - Lifetime costs associated with manufacture of wind turbines and construction;
 - Loss of carbon from backup power generation;
 - Loss of carbon-fixing potential of peatland;
 - Loss and/or saving of carbon stored in peatland (by peat removal or changes in drainage); and
 - Carbon gains due to proposed habitat improvements such as bog restoration.
- 15.3.28 This assessment draws on information detailed in the EIA Report, **Chapter 8: Ecology** and **Chapter 10: Hydrology, Hydrogeology, Geology and Soils**. For the purpose of this assessment, it is assumed that all the embedded good practice measures outlined in **Chapter 8: Ecology**, and **Chapter 10: Hydrology, Hydrogeology, Geology and Soils**, would be employed.



- 15.3.29 The final wind turbine choice is not yet known, but is anticipated to be approximately a 6.2MW machine, and the Proposed Development would consist of four wind turbines. The greenhouse gas savings and carbon payback are based on these input parameters. Figures are based on currently available wind turbines and assume a consistent supplier for all turbine locations (i.e. wind turbine types are chosen by manufacturer). Note that, within the calculation spreadsheet, the expected, maximum and minimum values have been adjusted to suit the input parameter.
- 15.3.30 The Site specific capacity factor used in the calculation spreadsheet is 40%, based on Site-specific lidar measurements and yield assessment.
- 15.3.31 The input parameters for the Scottish Government calculation spreadsheet are detailed in **Technical Appendix 15.1: Carbon Balance Assessment**. The choice of methodology for calculating the emission factors uses the 'Site Specific methodology' defined within the calculation spreadsheet.

Results of the Carbon Assessment

- 15.3.32 This section presents a summary of the carbon assessment which has been undertaken in respect of the Proposed Development. The purpose of the 'carbon calculator' is to assess, in a comprehensive and consistent way, the carbon impact of wind energy developments. This is undertaken by comparing the carbon costs of manufacture and construction with the carbon savings attributable to a development through operation. An assessment has been undertaken to calculate the carbon emissions which would be generated in the construction, operation and possible decommissioning of the Proposed Development after an illustrative 40 years.
- 15.3.33 The calculations spreadsheet is provided in **Technical Appendix 15.1: Carbon Balance Assessment**. A summary of the anticipated carbon emissions and carbon payback of the Proposed Development relative to the current Department for Energy Security and Net Zero figures is provided in **Table 15-7**.

Table 15-7: Proposed Development CO₂ Emissions and Payback Time

Results	Exp.	Min.	Max.
Net emissions of carbon dioxide (t CO ₂ eq.) (carbon losses minus carbon gains) per annum.	45,215	44,438	45,862
Carbon Payback Time			
...coal-fired electricity generation (years)	0.6	0.6	0.6
...grid-mix of electricity generation (years)	2.9	2.9	3.0
...fossil fuel – mix of electricity generation (years)	1.2	1.1	1.2
Ratio of CO ₂ eq. emissions to power generation (g/kWh) (Target ratio by 2030 (electricity generation))	21	20	21

- 15.3.34 The calculations of total carbon dioxide emission savings and payback time for the Proposed Development indicates the overall payback period of a development with 4 wind turbines with an expected installed capacity of around 6.2MW each, would be approximately 1.2 years (14 months), when compared to the fossil fuel mix of electricity generation.
- 15.3.35 This means that the Proposed Development is expected to take around 14 months to repay the carbon exchange to the atmosphere (the CO₂ debt) through construction of the wind turbines; the Proposed Development would in effect be in



a net gain situation following this time period and would contribute to national CO₂ reduction targets.

- 15.3.36 The potential savings in CO₂ emissions³ due to the Proposed Development replacing other electricity sources over the lifetime of the wind turbines (assumed to be 40 years for the purpose of the carbon calculator) are approximately:
- 79,860 tonnes of CO₂ per year over coal-fired electricity;
 - 15,381 tonnes of CO₂ per year over a grid-mix of electricity; and
 - 38,931 tonnes of CO₂ per year over a fossil fuel mix of electricity.
- 15.3.37 **Chapter 4: Renewable Energy and Planning Policy** provides details on the current renewable energy targets, such as the Scottish Government target of reaching net zero emissions by 2045. The potential savings in CO₂ emissions due to the Proposed Development would help in reaching this, and other, targets.

Assessment of Potential Effects

- 15.3.38 As detailed in paragraph 15.3.18, the climate and the atmosphere is considered to have “Very High” sensitivity to changes in greenhouse gas emissions.
- 15.3.39 Based on the results from the Carbon Calculator (**Technical Appendix 15.1**), it is concluded that the Proposed Development would result in potential savings in CO₂ emissions of between 15,381 and 79,860 tonnes per year. Despite these considerable CO₂ emissions savings, the magnitude of effect is considered ‘Low’ (refer to **Table 15-4**), as there would only be a slight, detectable, change to the baseline condition as a result of these emissions savings.
- 15.3.40 The Proposed Development is therefore assessed (refer to **Table 15-5**) to have ‘Moderate’ beneficial (positive) environmental effects, which are **significant** under the EIA Regulations.

Cumulative Effects

- 15.3.41 The Proposed Development, when considered in conjunction with other renewable energy developments, would contribute to Scotland and the UK’s aims to reduce carbon emissions and achieve their respective greenhouse gas emissions targets.
- 15.3.42 Data published by the Department for Energy Security and Net Zero (DESNZ) in June 2026 (Energy Trends June 2026), shows that renewable electricity represented 52.5% of total UK generation in 2025. The share of renewable energy generation derived from onshore and offshore wind was 30% in 2025, up 0.8% on 2024. Of the total renewable electricity generation in the UK, onshore wind accounts for 12.1%.
- 15.3.43 The Proposed Development would contribute between 20MW and 30MW of installed capacity which would contribute to increasing renewable energy generation capacity within Scotland and the UK.
- 15.3.44 The cumulative effect of the Proposed Development with other Scottish and UK renewables generation, is considered to be a fundamental change in the climate effects of Scottish / UK energy supply, and contribute to legally binding emission reduction targets.

³ It should be noted that the Scottish Government is seeking to decarbonise other CO₂ generating activities through electrification or electric plant and equipment. The displacement of CO₂ emissions from these activities over the course of the lifetime of the Proposed Development is not captured by the carbon calculations.



- 15.3.45 As a 'Very High' sensitivity receptor (i.e., very high environmental value, and of international importance), with a 'High' magnitude of effect (i.e., a fundamental change to the baseline condition), this represents a Major, beneficial (positive) effect that is **significant** under the EIA Regulations.

Mitigation

- 15.3.46 Mitigation has been embedded throughout the iterative design process. With regards to greenhouse gas emissions, this has primarily been through the avoidance of proposing infrastructure on deeper areas of peat, and the utilisation of existing infrastructure on Site i.e. forestry tracks.
- 15.3.47 The EIA Report includes various documents (at outline stage) that are to be implemented during the construction and operation of the Proposed Development should it receive consent. These include an outline Construction Environmental Management Plan (CEMP), an outline Soils and Peat Management Plan (SPMP), and an outline Habitat Management Plan (HMP). These documents include recommendations with regards best practice measures to be adopted during the construction of the Proposed Development, as well as proposals for habitat enhancement on Site.
- 15.3.48 The Proposed Development is assessed as having a beneficial (positive) effect due to the CO₂ emission savings during the operational lifetime of the Proposed Development. This is assessed as being a net benefit of the Proposed Development with regards to tackling climate change. Any adverse, negative effects, with regards greenhouse gas emissions, as a result of the Proposed Development, would be temporary (for 14 months following construction, until the carbon payback period has ended). No further mitigation is therefore required other than that already embedded into the Proposed Development and best practice construction recommendations.

15.4 Risk of Accidents and Other Disasters

- 15.4.1 The vulnerability of the Proposed Development to major accidents and natural disasters, such as flooding, sea level rise, or earthquakes, is considered to be low due to its geographical location and the fact that its purpose is to ameliorate some of these issues.
- 15.4.2 In addition, the nature of the proposals and relative remoteness of the Site mean there would be negligible risks on the factors identified by the EIA Regulations. For example:
- Population and human health: the Site is located far from major population centres, with low population density, and the required safety clearances around the turbines has been a key consideration throughout the design process;
 - Biodiversity: receptors and resources would be unaffected as there would be little risk of polluting substances released or loss of habitat in a wind turbine failure scenario (highly unlikely);
 - Land, soil, water, air and climate: there would be little risk of polluting substances released or loss of habitat in a wind turbine failure scenario (highly unlikely); and
 - Material assets, cultural heritage and the landscape: there would be no adverse effects on these features in a wind turbine failure scenario (highly unlikely).



Public Safety and Access

- 15.4.3 The Renewable UK Onshore Wind Health and Safety Guidelines (2015) note that wind farm development and operation can give rise to a range of risks to public safety, including:
- Traffic (especially lorries during construction, and abnormal loads for the transport of wind turbine components; including beyond the Site boundary);
 - Construction site hazards (particularly to any people entering the Site without the knowledge or consent of the site management);
 - Effects of catastrophic wind turbine failures, which may on rare occasions result in blade throw, tower topple or fire; and
 - Ice throw, if the wind turbine is operated with ice build-up on the blades.
- 15.4.4 The Renewable UK guidance (2015) states that *“Developers should ensure that risks to public safety are considered and managed effectively over the project lifecycle, and should be prepared to share their plans for managing these risks with stakeholders and regulators; effective engagement can both build trust, and help to reduce the level of public safety risk by taking account of local knowledge”*.
- 15.4.5 Site security and access during the construction period would be governed under Health and Safety at Work Act 1974 and associated legislation. Limited public access would be permitted through the Site during construction. However, the Land Reform (Scotland) Act 2003 which came into effect in February 2005 establishes statutory rights of responsible access on and over most land. The legislation offers a general framework of responsible conduct for both those exercising rights of access and for landowners. Once the construction period and commissioning of the Proposed Development is complete, no special restrictions on access are proposed. An outline Access Management Plan is provided as **Technical Appendix 15.2**.
- 15.4.6 Appropriate warning signs would be installed concerning restricted areas such as the substation compound, switchgear and metering systems. All on Site electrical cables would be buried underground with relevant signage. Following implementation of the required measures, the risk to public safety is concluded to **not result in a significant effect**.

Traffic

- 15.4.7 Accident data for roads within the Traffic and Transport Study Area has been reviewed, and is presented in **Chapter 12: Traffic and Transport**. In summary, the increase in vehicle movements during the busiest construction months would, once relevant mitigation is applied, **not result in a significant effect**.

Construction

- 15.4.8 With regard to risks and accidents during the construction phase, the construction works for the Proposed Development would be undertaken in accordance with primary health and safety legislation, including the Health and Safety at Work Act 1974 and the Construction (Design and Management) (CDM) Regulations 2015 which will include a requirement to produce emergency procedures in a Construction Phase (Health & Safety) Plan in accordance with the Regulations.
- 15.4.9 Nonetheless, the risk of accidents and other disasters is covered where relevant in individual topic chapters, for instance, the potential for environmental incidents and accidents such as spillages are considered in **Chapter 8: Ecology**, **Chapter 9: Ornithology** and **Chapter 10: Hydrology, Hydrogeology and Geology**. Flood



risk is also assessed with **Chapter 10**. The level of effect is concluded as **not significant**, following the implementation of a health and safety requirements.

Extreme Weather

- 15.4.10 As far as the risk of wind turbine failure during high winds is concerned, the wind turbines would cut-out and automatically stop as a safety precaution in wind speeds over 50m/s.
- 15.4.11 Wind turbines can be susceptible to lightning strike due to their height and appropriate measures are taken into account in the design of wind turbines to conduct lightning strikes down to earth and minimise the risk of damage to wind turbines. Occasionally however, lightning can strike and damage a wind turbine blade. Modern wind turbine blades are manufactured from a glass-fibre or wood-epoxy composite in a mould, such that the reinforcement runs predominantly along the length of the blade. This means that blades will usually stay attached to the turbine if damaged by lightning and in all cases wind turbines will automatically shut down if damaged by lightning.
- 15.4.12 Ice build-up on blade surfaces occurs in cold weather conditions. Wind turbines can continue to operate with a very thin accumulation of snow or ice, but will shut down automatically as soon as there is a sufficient build up to cause aerodynamic or physical imbalance of the rotor assembly. Potential icing conditions affecting turbines can be expected two to seven days per year (light icing) in Scotland (WECO, 1999). The potential for ice throw to occur after start up following a turbine shut down during conditions suitable for ice formation is high. There are monitoring systems and protocols in place to ensure that turbines that have been stationary during icing conditions are restarted in a controlled manner to ensure public safety. The risk to public safety is considered to be very low due to the few likely occurrences of these conditions along with the particular circumstances that can cause ice throw.
- 15.4.13 The risk to the environment and the public, from the Proposed Development, as a result of extreme weather is concluded to be **not significant**.

Seismic Activity

- 15.4.14 There are no records of any earthquakes occurring in the vicinity of the Site within the last 25 years (Earthquake Track). Earthquakes in Scotland are typically no greater than 4 on the Richter Scale and, therefore, slight and unlikely to cause significant damage to buildings and infrastructure.
- 15.4.15 It is very unlikely that an earthquake would occur in the vicinity of the Site resulting in any damage to the Proposed Development. Should a wind turbine be damaged, the risk to public safety is considered to be negligible due to the relatively remote location and careful design layout of the infrastructure. Therefore, the risk to the environment and the public, from the Proposed Development, as a result of seismic activity is concluded to be **not significant**.

15.5 Population and Human Health

- 15.5.1 **Chapter 7: Landscape and Visual, Chapter 10 Hydrology, Hydrogeology, Geology and Soils, Chapter 12: Traffic and Transport, and Chapter 13: Noise** contain assessments which relate to the health and wellbeing of the local population. These chapters assess the effects of the Proposed Development, both positive and negative, provide an analysis of the significance of these effects, and also put forward measures to mitigate against negative effects on people and their health.



- 15.5.2 **Chapter 16: Schedule of Commitments**, provides an overview of the mitigation put forward as part of these assessments in order to reduce any negative effects of the Proposed Development to an acceptable level.
- 15.5.3 Further to the topics covered in **Chapters 7 – 15**, including this chapter, it is expected that there will be **no significant effects** on population and human health.

15.6 Air Quality

- 15.6.1 Construction activities can result in temporary effects from dust if unmanaged. This can result in nuisance effects such as soiling of buildings and, if present over a long period of time, can affect human health. As the nearest, non-financially involved property is over 1km away from any substantial construction works (e.g. wind turbines, substation compound, borrow pits, new tracks) effects associated with dust or vehicle emissions are considered unlikely. In addition to this, mitigation measures will be included within the full Construction Environmental Management Plan (CEMP) for the Proposed Development. Therefore, the effects of dust and vehicle emissions from the construction and operation of the Proposed Development have been scoped out of this assessment.

15.7 Telecommunications and Television Reception

- 15.7.1 This section summarises the potential effects on telecommunications during the construction and operational phases of the Proposed Development, based on an open-source data search undertaken to identify telecommunications fixed links and infrastructure in the vicinity of the Site.
- 15.7.2 Microwave wireless communication links are used to transmit information between two antennae via radio waves within a particular frequency band, typically line-of-sight between the two locations. There are also exclusion zones on the perimeter of such links requiring protection from the effects of development. These further 2-dimensional clearance calculations have been considered in order to determine the extent of any clearance or potential infringement of the Proposed Development, and with the relevant stakeholder then approach for comment.
- 15.7.3 Planning policy relating to telecommunications is found within the Scottish Government NPF4 (Policy 11e(v): Energy). In addition to this the following guidance was considered:
- British Wind Energy Association - Best Practice Guidelines of Wind Energy Developments; and
 - The Scottish Government - Onshore Wind Turbine: Planning Advice.
- 15.7.4 Additionally, 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. However, the Proposed Development is located in an area which is now served by a digital transmitter, making such interference unlikely, as digital signals are less susceptible to this type of disruption. In the rare event that television signals are affected, reasonable mitigation measures will be considered.

Consultation

- 15.7.5 The following telecommunications consultees were contacted in May 2022 in order to understand if they had any concerns regarding the Proposed Development and potential impacts on their telecommunications infrastructure:



- Arqiva;
 - Atkins;
 - Joint Radio Company (JRC);
 - British Telecom (BT);
 - MBNL (EE/Three);
 - Vodafone; and
 - Virgin Media.
- 15.7.6 All of the above organisations responded advising that they had no concerns with regards to potential impacts on their telecommunications infrastructure, with the exception of Vodafone. Vodafone advised that they had received planning permission to install a telecommunication mast within the Site boundary of the Proposed Development. Following further consultation with Vodafone it was confirmed that this telecommunication mast was not going to be constructed. Planning permission (under planning reference 22/00715/FUL) for the telecommunication mast has now expired unimplemented after 08 December 2025.
- 15.7.7 The following telecommunications consultees were contacted as part of the EIA scoping process, with none advising of any telecommunications-related concerns:
- Airwave Solutions Ltd
 - Atkins
 - Joint Radio Company (JRC)
 - British Telecom (BT)
 - Ofcom
 - MBNL (EE/Three)
 - Vodafone
 - Telefonica / O2
- 15.7.8 Given the time that has elapsed since the initial consultation process and the subsequent scoping process (completed in late 2024), further consultation with telecommunications consultees was undertaken in April and May 2026. The aim of this further consultation was to confirm that the key telecommunications stakeholders still did not have any concerns regarding their infrastructure and the Proposed Development, and to engage with the Critical National Infrastructure (CNI) and Emergency Services (ES) network operators. The responses are summarised in **Table 15-8**.

Assessment Methodology

- 15.7.9 The assessment was conducted using an extensive database of infrastructure and open-source documentation to conduct a survey to assess the proximity of the fixed links and infrastructure to the Proposed Development.
- 15.7.10 Thereafter, consultation was conducted with the telecommunications operators and operators of CNI and ES networks to identify any impacts the Proposed development may have their current or planned network infrastructure.
- 15.7.11 The assessment was conducted against the wind turbine coordinates in **Table 15-8**.



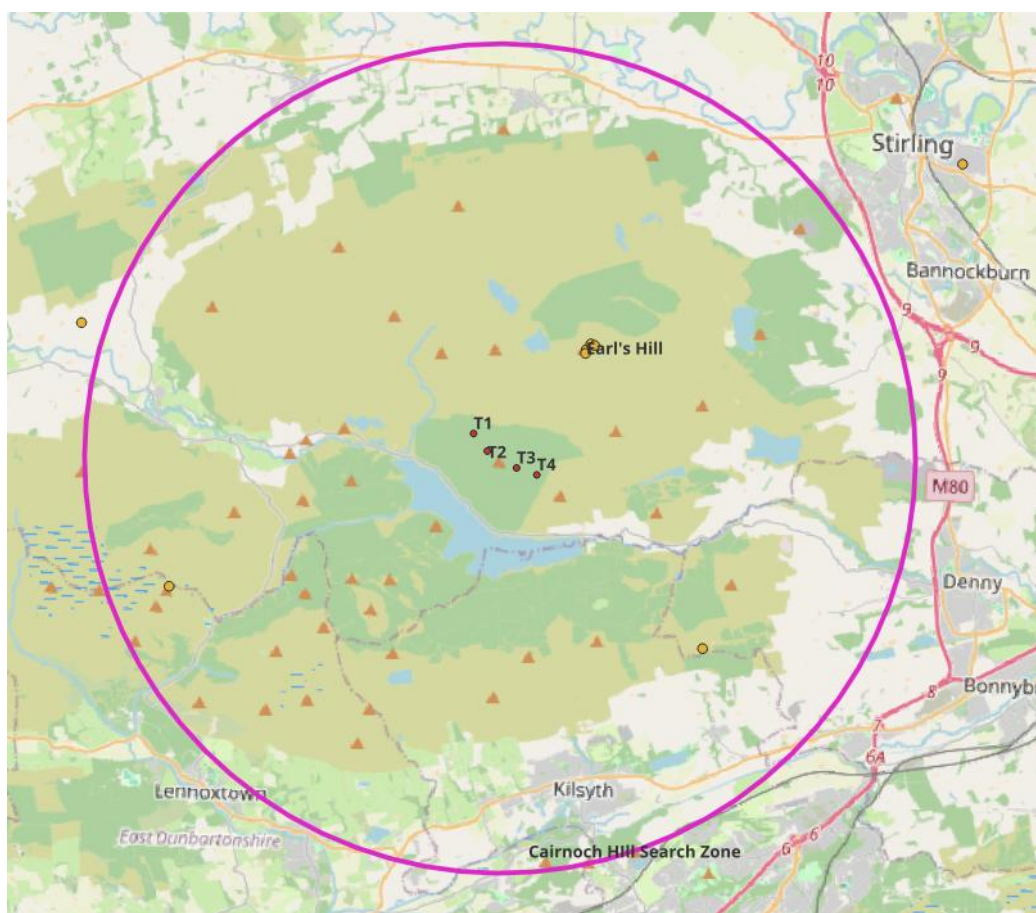
Table 15-8: Assessed Wind Turbine Positions

Turbine	X Coordinate	Y Coordinate
T1	269183	686380
T2	269514	685957
T3	270220	685551
T4	270707	685384

Study Area

15.7.12 Using publicly available information, a search of mast and fixed links located within 10km of the Site was conducted. The following operators were identified as having fixed links and infrastructure in the search area: Arqiva, Airwave Solutions Ltd, British Telecom Ltd (BT), Joint Radio Company (JRC), Mobile Broadband Networks Ltd ((MBNL)Three/EE) and Vodafone. See **Plate A**.

Plate A: Telecommunications Study Area



Limitations to Assessment

15.7.13 There are no limitations to the assessment other than Airwave do not usually respond to consultation requests until a planning application is formally submitted.



Baseline Conditions

- 15.7.14 A number of fixed links were identified in the wider area but none within the actual Site itself.
- 15.7.15 None of the operators identified have fixed telecommunications links crossing the Site. The nearest fixed infrastructure identified is at Earl's Hill, which is approximately 3.3km from the Site.
- 15.7.16 **Table 15-9** sets out the most recent consultation responses from key telecommunications stakeholders, regarding their infrastructure and the Proposed Development.

Table 15-9: Summary of Most Recent Consultation

Consultee	Consultee Comments
Arqiva (28/04/26)	Confirmed they have no objection to the Proposed Development but request a resubmission should the wind turbine locations be changed. (30 April 2026).
Atkins (28/04/26)	Confirmed that the Proposed Development will not have an impact upon their infrastructure. (28 April 26).
BT (28/04/26)	Confirmed that the Proposed Development will not have an impact upon their infrastructure. Request a resubmission should the wind turbine locations or dimensions be changed. (5 May 26).
JRC (28/04/26)	Confirmed they have no objection to the Proposed Development, and a 50m micro-siting limit. Request a resubmission should the wind turbine locations or dimensions be changed. (29 April 26).
MBNL (EE/Three) (13/05/26)	Confirmed that the Proposed Development will not have an impact upon their infrastructure. (18 May 2026).
Vodafone (28/04/26)	Confirmed that the Proposed Development will not have an impact upon their infrastructure. (28 April 2026).

Future Baseline

- 15.7.17 On the basis of the information currently available, no changes to the baseline conditions are anticipated in the event that the Proposed Development does not proceed.

Potential Effects

Construction

- 15.7.18 There are no effects from the Proposed Development on Telecommunications predicted during the construction phase. This will be subject to a response from Airwave, when consulted as part of the full planning application.

Operation

- 15.7.19 There are no effects from the Proposed Development on Telecommunications predicted during the operational phase. This will be subject to a response from Airwave, when consulted as part of the full planning application.

Cumulative Effects

- 15.7.20 There are no effects on any telecommunications infrastructure predicted, and the Proposed Development should not, therefore, be able to contribute to any



cumulative effects. This will be subject to a response from Airwave, when consulted as part of the full planning application.

Summary and Statement of Significance

- 15.7.21 None of the operators identified have fixed links crossing the Site. The nearest fixed infrastructure identified in the survey is at Earl's Hill, which is 3.3km from the Proposed Development.
- 15.7.22 There are no effects predicted from the Proposed Development on Telecommunications infrastructure operated by the operators consulted. This will be subject to a response from Airwave, when consulted as part of the full planning application.
- 15.7.23 Therefore, effects on Telecommunications infrastructure, from the Proposed Development, as a result of the Proposed Development are concluded to be **not significant**.

15.8 Waste and Environmental Management

- 15.8.1 Where relevant, environmental topic **Chapters 7 to 14** put forward suggestions on how to mitigate any negative impacts from the Proposed Development with regards to waste and environmental management. These are summarised in **Chapter 16: Schedule of Commitments**.
- 15.8.2 The outline CEMP (**Technical Appendix 3.1**) provides a general overview on how waste and other environmental issues would be managed during the construction phase. **Technical Appendix 10.1: Peat Landslide Hazard Risk Assessment** presents the results of peat probing and coring undertaken across the Site, which inform the approach to avoiding areas of deeper peat. Measures for the control, storage, re-use and reinstatement of any shallow excavated peat are set out within the **Technical Appendix 3.1: Outline CEMP**, and **Technical Appendix 10.2: Outline Soils and Peat Management Plan**.
- 15.8.3 It is expected that a Site-specific waste management plan for the control and disposal of waste generated on Site would be required by condition, should the Proposed Development receive consent. Therefore, it is not considered necessary for waste to be assessed further within this EIA Report and is scoped out of further assessment.

15.9 Summary and Statement of Significance

- 15.9.1 An assessment (considered construction and operational phases) of the potential effects of the Proposed Development on the following topics has been undertaken:
- Shadow Flicker;
 - Climate and Carbon Balance;
 - Risk of Accidents and Other Disasters;
 - Population and Human Health;
 - Air Quality;
 - Telecommunications and Television Reception; and
 - Waste and Environmental Management.
- 15.9.2 The Proposed Development design has been informed by site-specific surveys and the consideration of constraints related to the topics covered in this chapter.



- 15.9.3 Embedded mitigation and industry standard good practice measures have been identified and are committed to within this chapter and wider EIA Report.
- 15.9.4 It has been shown, as a consequence of the Proposed Development design and with the adoption of mitigation and industry standard good practice, there are **no significant adverse effects** predicted in relation to the topics covered in this chapter, as a result of the Proposed Development.



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15.11 Abbreviations List

Abbreviation	Meaning
AIL	Abnormal Indivisible Load
AILV	Abnormal Indivisible Load Vehicle
BT	British Telecom
CEMP	Construction Environmental Management Plan
CNI	Critical National Infrastructure
CO ₂	Carbon Dioxide
DECC	Department of Energy and Climate Change
DESNZ	Department for Energy Security and Net Zero
DTM	Digital Terrain Model
EE	Everything Everywhere
EIA	Environmental Impact Assessment
ES	Emergency Services
FLS	Forestry and Land Scotland
HMP	Habitat Management Plan
JRC	Joint Radio Company
MBNL	Mobile Broadband Network Limited
MW	Megawatt
NPF4	National Planning Framework 4
OS	Ordnance Survey
PPS 18	Planning Policy Statement 18
SIS	Spectrum Information System
SLR	SLR Consulting Limited
SPMP	Soils and Peat Management Plan
UK	United Kingdom



Making Sustainability Happen



Chapter 16: Schedule of Commitments

Environmental Impact Assessment Report

Cairnoch Hill Wind Farm

3 August 2026



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.



Revision	Prepared By	Checked By	Approved By	Description
1.0	V. Ramirez	A. Smith	A. Smith	-



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16.0 Introduction

- 16.1.1 The Schedule of Commitments identifies the mitigation, compensation and enhancement measures that have been proposed throughout the Environmental Impact Assessment (EIA) Report to prevent, reduce or offset the effects of the Proposed Development on the environment.
- 16.1.2 Mitigation measures have been integral to the design evolution of the Proposed Development as described in **Chapter 2: Design Evolution and Alternatives**. A series of environmental and technical constraint design reviews were undertaken to minimise potential significant environmental impacts prior to finalising the design of the Proposed Development. Areas which were examined in depth include landscape and visual constraints, peat, sensitive habitats, cultural heritage and hydrological constraints.
- 16.1.3 The mitigation measures in **Table 16-1** are those which would 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.
- 16.1.4 Embedded design mitigation measures are not included in the table but are described in **Chapter 2: Design Evolution and Alternatives**



16.1 Schedule of Commitments

Table 16-1: Schedule of Commitments

Chapter	Type of Mitigation Compensation or Enhancement	Mitigation, Compensation or Enhancement Measure
Chapter 3: Description of Development	Pre Construction, During Construction and Post Construction (CEMP)	Outline Construction and Environment Management Plan (CEMP) An outline CEMP for the Proposed Development is provided in Technical Appendix 3.1 which sets out the principles which would be detailed in a detailed CEMP, to be agreed prior to construction commencing. This detailed CEMP would be agreed with Stirling Council in consultation with relevant statutory consultees. The detailed CEMP would, as a minimum, include key details of: • An updated Schedule of Mitigation (SM); • Construction Method Statements (CMS); • Site Health and Safety Plan (HSP); • Environmental Incident and Emergency Response Plan (EIERP); • Emergency Pollution Prevention Plan (EMPP); • Soils and Peat Management Plan (SPMP); • Water Quality and Fish Monitoring Plan (WQFMP); • Site Waste Management Plan (SWMP); • Construction Traffic Management Plan (CTMP); and • An updated Access Management Plan (AMP). <u>Ecological Clerk of Works (ECoW)</u> An ECoW shall be appointed during construction and post-construction restoration periods as required. The services of other specialist advisors will be retained as appropriate, such as an Archaeological Advisor, to be called on as required to advise on specific environmental issues. The Principal Contractor will ensure construction activities are carried out in accordance with the mitigation measures outlined in this Schedule of Commitments, the EIA Report and any planning conditions, and this will be monitored by the applicant and the ECoW.



Chapter	Type of Mitigation Compensation or Enhancement	Mitigation, Compensation or Enhancement Measure
		<u>Watercourse Crossings</u> Existing watercourse crossings shall be upgraded where necessary. All crossings shall comply with The Environmental Authorisations (Scotland) Regulations 2018 (SSI 2018/219), as amended (including by the Environmental Authorisations (Scotland) Amendment Regulations 2025) requirements, and be designed to maintain hydraulic capacity, including the 1 in 200-year flood event plus climate change allowance, and minimise impacts on the water environment. <u>Borrow Pit</u> The location and size of the borrow pit would be carefully planned to avoid any sensitive ecological areas, such as protected species habitats, watercourses, or areas of high environmental value. In accordance with the Quarry Regulations 1999, borrow pits that are created for the exclusive purpose of supplying materials to the Site are exempt from the usual quarry regulations. The detailed design and method of working of each borrow pit would be outlined in the final CEMP, ensuring that environmental safeguards are in place during the excavation phase. <u>Reinstatement</u> Once construction is completed, reinstatement of disturbed areas would begin immediately. This would include the reapplication of stored soils and vegetation in a manner consistent with the original landscape. Immediate aftercare measures will be implemented, including inspections of reinstated areas following completion of works at each location. Regular maintenance visits would be carried out to monitor the success of re-vegetation efforts, and any failures would be addressed promptly. In addition, erosion control measures would be implemented on embankments and cuttings, such as designing appropriate gradients and stabilisation techniques. Sediment traps would be employed during the initial years following construction to control sedimentation until vegetation is fully re-established. Peat reinstatement would begin promptly after completing works at each wind turbine, crane pad, or access track section, following the finalised SPMP and any biodiversity enhancement plans. Initial reprofiling would use suitable subsoil and peat to restore natural microtopography and prevent erosion. Turves will then be re-laid in their original orientation, aligning with the pre-existing vegetation pattern. In sensitive areas, such as near watercourses or steep slopes, additional stabilisation measures like small peat or stone bunds, shallow contour grips, or biodegradable geotextiles will be implemented to minimise erosion while vegetation re-establishes.



Chapter	Type of Mitigation Compensation or Enhancement	Mitigation, Compensation or Enhancement Measure
		If unforeseen erosion or sedimentation occurs, the affected areas would be regraded to restore stability. Disturbed ground along access tracks would be promptly reinstated to blend with the surrounding landscape, using on-site vegetation and soil through turfing or reseeded with local species like heather. All reinstatement methods would be confirmed in consultation with relevant authorities, including the Principal Contractor and NatureScot, using heather brash or treated seeds for compatibility with the ecosystem.
	Construction	Working Hours Construction hours will be limited to 07:00 to 19:00 Monday to Friday and 07:00 to 16:00 on Saturdays. Certain activities including abnormal load deliveries, concrete pours and wind turbine erection may occur outwith these hours. Sunday working may occur where agreed with Stirling Council.
	Construction (Micrositing)	Micrositing It is proposed that a 50m micrositing allowance shall apply to all wind turbines and associated infrastructure, provided infrastructure is not moved into watercourse buffers and environmental constraints are appropriately considered. Micrositing would be subject to approval of the ECoW as required and in consideration of other known constraints.
	Construction	Lighting Artificial lighting may be required during the construction phase to ensure safe working conditions, during periods of limited natural light. Examples include vehicle and plant headlights, construction compound lighting, floodlights and mobile lighting units - to be used around specific construction activities. It is intended that the type of lighting would be non-intrusive (e.g. directed towards work activity and away from the Site boundary), to minimise impact on local properties and any other environmental considerations.
	Construction	Materials Sourcing and Waste Management For construction, the Proposed Development would require a range of materials (e.g. stone for access tracks, the temporary Site compound and the substation compounds). Excavated material from the wind turbine bases and access tracks would be used onsite for restoration/reinstatement. A Site Waste Management Plan would be developed for implementation during construction. This outlines the material requirements and waste generation during construction and how the applicant intends to consider the management of these aspects. Concrete would be batched onsite at the construction compound for which water would be required.



Chapter	Type of Mitigation Compensation or Enhancement	Mitigation, Compensation or Enhancement Measure
	Post Construction	Site Restoration The ultimate decommissioning protocol would be agreed with Stirling 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 Decommissioning and Restoration Plan ("DRP"). The final, detailed, DRP would reflect the relevant legislation, and best practice current at the time of decommissioning and restoration.
	Post Construction	Tree Planting In order to comply with the Scottish Government's Control of Woodland Removal Policy (Scottish Government, 2009) compensation planting would be required to mitigate for the loss of woodland area as a result of the Proposed Development. The Applicant is committed to providing appropriate compensatory planting. The extent, location and composition of such planting to be agreed with Scottish Forestry, taking into account any revision to the felling and restocking plans prior to the commencement of construction. The Outline Habitat Management Plan (HMP) (Technical Appendix 8.6 of the EIA Report) has been developed to ensure the Proposed Development includes provision for biodiversity improvements and enhancement. In the case of Cairnoch Hill, the Outline HMP has been prepared, taking into account the Carron Valley Land Management plan 2025 - 2035. As the majority of the proposal areas within the Outline HMP are currently inaccessible and impractical to fell specifically for the implementation of a HMP, it is proposed that the timing of HMP related felling and planting would be confirmed, post any consent (as part of a detailed HMP), in agreement with FLS and Scottish Forestry.
Chapter 8: Ecology	Pre Construction	Pre Construction Surveys Due to the time that will have elapsed since the surveys undertaken in 2024, it is possible that the presence and home ranges/territories of protected species within the Site will have changed by the time construction commences. This is relevant for otter, pine marten, red squirrel, badger and roosting bats. A pre-construction walkover survey for protected species, following relevant good practice methods, would therefore be undertaken to identify changes to the baseline and to inform the development of a Species Protection Plan. The survey would cover all watercourses and other areas of suitable habitat within up to 200m of any areas that would be affected by construction works.



	Pre and During Construction	Ecological Clerk of Works (ECoW) A suitably qualified ECoW would be appointed prior to the commencement of construction to advise on all ecological management. The ECoW would be employed for the duration of the construction and reinstatement periods, to oversee the safeguarding of natural heritage interests. The role of the ECoW would include the following tasks: • Giving briefings to relevant staff regarding any ecological sensitivities onsite; • Undertake pre-construction surveys (bats, reptiles, otter, badger, pine marten etc.) and advise on ecological issues where required; • Supervision of implementation of the HMP measures which are to be undertaken during the construction phase; • Monitoring compliance during the construction and decommissioning phases of the Proposed Development and reporting any breaches to the applicant's Construction Project Management Team; • Give toolbox talks to all staff onsite, e.g. an ecological induction, so staff are aware of the ecological sensitivities on the Site and the legal implications of not complying with agreed working practices; • Agree and monitor measures designed to minimise damage to retained habitats (and habitats for which restoration is proposed as part of the HMP); • Undertake pre-construction surveys and checks and advise on ecological issues where required; and • Undertaken pre-construction inspections of areas which require reptile mitigation and carry out an appropriate level of supervision during vegetation clearance. The ECoW would also undertake additional roles such as assisting with water quality monitoring and checking for nesting birds (see Chapter 9: Ornithology and Chapter 10: Hydrology, Hydrogeology, Geology and Soils of the EIA Report). Hazards to Protected Mammals All potentially dangerous substances or materials within the temporary construction compound would be carefully stored to prevent them causing any harm to otters or other mammal species which may enter the compound at night. During construction, all excavations greater than 1m depth would either be temporarily covered at night or designed to include a ramp to allow otters and other animals a means of escape should they fall in.



		A speed limit of no greater than 15mph would be implemented onsite to reduce the risk of road traffic collisions. Surface Water and Peat Soils Good practice measures in relation to pollution risk, sediment management and watercourse crossings to be adopted during the construction and operation phases are set out in Chapter 10 and Technical Appendix 3.1: Outline CEMP (detailed CEMP to be agreed with Stirling Council in consultation with relevant statutory consultees, prior to construction work commencing). During the construction phase, good practice techniques with respect to peatland environments, as contained within 'Good Practice during Wind Farm Construction' (SNH, 2019), would be implemented. Retained Habitat and Habitat Reinstatement Good practice measures to protect retained habitats during the construction phase would be implemented, including the erection of temporary protective fencing demarcating the working footprint, to be overseen and policed by the ECoW. Good practice techniques for vegetation and habitat reinstatement would be adopted and implemented on areas subject to disturbance during construction as soon as is practicable. Reptiles In order to comply with the Wildlife and Countryside Act 1981 (as amended in Scotland) mitigation would be employed to reduce the chances of inadvertently killing or injuring individual reptiles during construction works. Given the low numbers of reptiles likely to be present, the large areas of suitable habitat that would remain unaffected by the works and given also the large spatial scale of the works, fencing and translocation are not considered appropriate. Proposed mitigation therefore would involve identification/removal of potential refugia and hibernacula if present. The proposed Site speed limit of 15mph would also reduce the likelihood of accidental injury/killing of reptiles by construction traffic. Where appropriate and safe to do so, during the active season for reptiles (typically April to October) all potential refuges within construction working areas would be removed, and construction works will employ a 'soft start' to allow any individuals to exit the area. Outwith the active season, checks and removal of hibernacula would be conducted. These checks will be conducted under the guidance of the ECoW.



Chapter	Type of Mitigation Compensation or Enhancement	Mitigation, Compensation or Enhancement Measure																								
	Operation	Habitat Management Plan (HMP) As part of the Proposed Development there are a number of measures proposed, which would enhance, restore, and create onsite habitat for various species. These proposals are set out in Technical Appendix 8.6: Outline Habitat Management Plan, and include: <table> <tr> <th>Goal</th><th>Objective</th><th>Area</th></tr> <tr> <td rowspan="4">1. Native woodland</td><td>1.1 Fell conifer plantation</td><td rowspan="4">Broadleaf woodland creation areas (15.46 ha) Wet woodland management area (8.81 ha)</td></tr> <tr> <td>1.2 Plant Broadleaf woodland</td></tr> <tr> <td>1.3 Clear conifer trees from existing broadleaf woodland</td></tr> <tr> <td>1.4 Maintain broadleaf woodland free of conifer regeneration</td></tr> <tr> <td rowspan="3">2. Riparian zones</td><td>2.1 Fell conifer plantation</td><td rowspan="3">Riparian improvement zones (11.83 ha)</td></tr> <tr> <td>2.2 Plant Broadleaf woodland</td></tr> <tr> <td>2.3 Maintain broadleaf woodland free of conifer regeneration</td></tr> <tr> <td rowspan="3">3. Restoration of peatland</td><td>3.1 Increase water table in peatland restoration area through ditch blocking</td><td rowspan="3">Peatland restoration area (13.71 ha) Broadleaf woodland creation area – peatland buffer (13.92 ha)</td></tr> <tr> <td>3.2 Maintain peatland restoration area free of conifer regeneration</td></tr> <tr> <td>3.3 Create a broadleaf tree buffer</td></tr> <tr> <td rowspan="3">4. Creation and improvement of pond</td><td>4.1 Pond creation</td><td rowspan="3">Existing ponds (0.03 ha) New pond locations (0.02 ha) Pond buffers (1.36 ha) Pond connection corridors (0.18 ha)</td></tr> <tr> <td>4.2 Conifer removal to 20m from pond</td></tr> <tr> <td>4.3 Scrub planting</td></tr> </table>	Goal	Objective	Area	1. Native woodland	1.1 Fell conifer plantation	Broadleaf woodland creation areas (15.46 ha) Wet woodland management area (8.81 ha)	1.2 Plant Broadleaf woodland	1.3 Clear conifer trees from existing broadleaf woodland	1.4 Maintain broadleaf woodland free of conifer regeneration	2. Riparian zones	2.1 Fell conifer plantation	Riparian improvement zones (11.83 ha)	2.2 Plant Broadleaf woodland	2.3 Maintain broadleaf woodland free of conifer regeneration	3. Restoration of peatland	3.1 Increase water table in peatland restoration area through ditch blocking	Peatland restoration area (13.71 ha) Broadleaf woodland creation area – peatland buffer (13.92 ha)	3.2 Maintain peatland restoration area free of conifer regeneration	3.3 Create a broadleaf tree buffer	4. Creation and improvement of pond	4.1 Pond creation	Existing ponds (0.03 ha) New pond locations (0.02 ha) Pond buffers (1.36 ha) Pond connection corridors (0.18 ha)	4.2 Conifer removal to 20m from pond	4.3 Scrub planting
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Chapter	Type of Mitigation Compensation or Enhancement	Mitigation, Compensation or Enhancement Measure		
			4.4 Maintain broadleaf woodland free of conifer regeneration	
		5. Provision and maintenance of wildlife boxes/nests	5.1 Provision and maintenance of brash piles	Broadleaf woodland creation areas Wet woodland management area Riparian zones Cairnoch Hill buffer Pond buffers
			5.2 Provision and maintenance of bat roost and hibernation boxes	
			5.3 Provision and maintenance of barn owl boxes	
			5.4 Provision and maintenance of small bird boxes	
			5.5 Provision and maintenance of osprey nesting platform(s)	Off-site
		6. Invasive species removal	6.1 Removal of giant hogweed	Giant hogweed site
		The outline HMP provides high level proposals for the above aims. The detailed HMP would provide further detail on how and where these proposals would be carried out, and management plans for doing so where appropriate. Outline Habitat Management Plan (Outline HMP) Technical Appendix 8.6 sets out the monitoring anticipated to be required during the operational phase of the wind farm (a detailed HMP would be agreed with Stirling Council, in consultation with relevant statutory consultees, prior to construction work commencing). Reporting and Review Monitoring results will be reported annually in years when monitoring takes place. The report shall include any recommended changes to management prescriptions considered necessary if objectives are not being met. As such, the detailed HMP would be a live document, such that it can be altered following monitoring results, unexpected events or evolving guidance.		



Chapter	Type of Mitigation Compensation or Enhancement	Mitigation, Compensation or Enhancement Measure
		The HMP would be reviewed every five years and, alongside amendments to existing measures, will include for the removal of prescriptions and monitoring at the point of objectives being met and conditions indicating they are self-sustaining.



Chapter 9: Ornithology	Pre-Construction, During Construction and Operation	Protection of nesting birds Identified nests will be subject to exclusion zones, within which no works will be permitted to commence. No personnel or vehicles will be allowed to enter or pass through these zones until the ECoW confirms that breeding activity has concluded. Toolbox Talks Ornithological toolbox talks will be provided prior to construction and at regular intervals, by the ECoW to ensure all contractors working on the Proposed Development are aware of any ornithological sensitivities on site and relevant legislation. Timing of works Construction works commencing during the breeding season will only proceed following checks that confirm no breeding birds are within likely disturbance distances to the proposed works. Vehicles Where construction works are required during the breeding bird season, mitigation measures to limit the impact of vehicular disturbance will be implemented. This will include no idling of vehicles, appropriate speed restrictions and dust suppression measures on Site. Habitat Management Plan (HMP) - Ornithology A detailed Habitat Management Plan (HMP) will be developed, pre construction, using the current proposed outline HMP (Technical Appendix 8.6) as a starting point. This detailed HMP will aim to monitor the occurrence of sensitive species on the Site with a view to identifying habitat management measures in support of species present. <u>Osprey Artificial Nesting Platforms</u> Prior to construction, at least one artificial osprey nesting platform shall be installed to reduce disturbance, displacement and collision risk associated with osprey. Detailed plans will be finalised through consultation with NatureScot and location plans shared with FLS. <u>Ecological Clerk of Works</u> A suitably qualified Ecological Clerk of Works (ECoW) would be employed to oversee activity at key points for the duration of the construction period to ensure that mitigation measures are reactive to



	changing conditions on Site and to ensure compliance with legislation protecting sensitive breeding birds. The ECoW will attend the Site regularly to monitor birds present in and around the areas where the works are planned, identify potential constraints and provide specific ornithological guidance. <u>Native Woodland Restoration</u> The Site is primarily comprised of non-native conifer, which has low biodiversity value. The closed-canopy conifers will be converted into open canopy mixed woodland that will support a greater diversity of bird species. <u>Provision and maintenance of wildlife boxes</u> Breeding boxes for birds will be provided in order to offer shelter and breeding space in areas where tree felling and restoration will occur. <u>Ornithology Monitoring</u> A programme of post consent monitoring is proposed. The exact scope of works is to be confirmed following the planning decision notice being awarded and then included within the detailed HMP, following consultation. It is considered likely to include breeding raptor and wader surveys, osprey surveys on artificial nests, nightjar surveys and black grouse surveys. It is proposed that ornithological monitoring should take place during and post-construction, in line with NatureScot guidance Pre-construction Surveys Pre-construction surveys will be undertaken to identify any breeding birds nesting within or close to working areas. Surveys will be undertaken by the ECoW, who will determine the scope of surveys required, which will be based on current disturbance guidance and professional judgement



Chapter 10: Hydrology, Hydrogeology, Geology and Soils	Pre and During Construction	Ecological Clerk of Works To ensure all reasonable precautions are taken to avoid negative effects on soil, peat and the water environment, a suitably qualified ECoW would be appointed prior to the commencement of construction to advise the Applicant and the Principal Contractor on ecological and hydrological matters. Good Practice Measures It is proposed to adopt Sustainable Drainage Systems (SuDS) as part of the Proposed Development. SuDS techniques aim to mimic pre-development runoff conditions and balance or throttle flows to the rate of runoff that might have been experienced at Site prior to development. Good practice in relation to the management of surface water runoff rates and volumes and potential for localised fluvial flood risk would include the following: • drainage systems would be designed to ensure that any sediment, pollutants or foreign materials which may cause blockages are removed before water is discharged into a watercourse; • onsite drainage would be subject to routine checks to ensure that there is no build-up of sediment or foreign materials which may reduce the efficiency of the original drainage design causing localised flooding; • appropriate drainage would attenuate runoff rates and reduce runoff volumes to ensure minimal effect upon flood risk; • where necessary, check dams would be used within cable trenches in order to prevent trenches developing into preferential flow pathways; and • as per good practice for pollution and sediment management, prior to construction, section specific drainage plans would be developed and construction personnel made familiar with the implementation of these. Good practice measures would be applied in relation to pollution risk, sediment management, peat management and management of flood risk and surface runoff rates and volumes. These would form part of the final Construction Environmental Management Plan (CEMP) which would be prepared during detailed design and secured by a planning condition prior to construction commencing. General Measures Prior to construction, site-specific drainage plans would be produced. These would consider any existing local drainage which may not be mapped and incorporate any site-specific mitigation measures identified during the assessment.



		Measures would be included in the final CEMP for dealing with potential pollution, sedimentation and flood risk incidents and would be developed prior to construction. This would be adhered to should any incident occur, reducing the effect as far as practicable. The final CEMP would contain details on the location of spill kits, would identify 'hotspots' where pollution may be more likely to originate from; provide details to site personnel on how to identify the source of any spill and state procedures to be adopted in the case of a spill event. A suitably qualified and experienced specialist spill response contractor would be identified to deal with any major environment incidents. This could be the Principal Contractor if suitable qualification and experience can be demonstrated prior to contract award. A wet weather protocol would be developed. This would detail the procedures to be adopted by all staff during periods of heavy rainfall. Toolbox talks would be given to engineering, construction and supervising personnel. Private Water Supplies Prior to construction, the locations of any currently unidentified private water supplies will be confirmed and assessed. A minimum 100m stand-off shall be maintained between infrastructure and identified private water supplies.



Chapter	Type of Mitigation Compensation or Enhancement	Mitigation, Compensation or Enhancement Measure
	Pre Construction, During Construction and Operational	Water Quality Monitoring Water quality monitoring before, during construction and post construction will be undertaken at the watercourses which drain the Site to ensure that none of the watercourses are carrying pollutants or suspended solids. Monitoring would be carried out at a specified frequency (depending upon the construction phase) as agreed with Stirling Council. Monitoring frequency would increase during the construction phase if remedial measures to improve water quality were implemented. The performance of the good practice measures would be kept under constant review by the water monitoring schedule, based on a comparison of data taken during construction with a baseline data set, sampled prior to the construction period.
	Construction	Good Practice Measures (Pollution) Good practice measures in relation to pollution prevention would include the following: • refuelling would take place at least 50m from watercourses and where possible it would not occur when there is risk that oil from a spill could directly enter the water environment; • foul water generated onsite would be managed in accordance with best practice and be drained to a sealed tank and routinely removed from Site; • a vehicle management plan and speed limit would be strictly enforced onsite to minimise the potential for accidents to occur; • drip trays would be placed under vehicles which could potentially leak fuel/oils when parked; • areas would be designated for washout of vehicles which are a minimum distance of 50m from a watercourse; • washout water would also be stored in the washout area before being treated and disposed of; • no direct or indirect discharges to watercourses without prior treatment in buffer zones or adjacent to proposed infrastructure using appropriate SuDS measures. These measures would be included in the drainage plans to be outlined in the final CEMP; • water would be prevented as far as possible, from entering excavations; • procedures would be adhered to for storage of fuels and other potentially contaminative materials in line with the EASR, to minimise the potential for accidental spillage; and



Chapter	Type of Mitigation Compensation or Enhancement	Mitigation, Compensation or Enhancement Measure
		• a plan for dealing with spillage incidents would be designed prior to construction, and this would be adhered to should any incident occur, reducing the effect as far as practicable. This would be included in the final detailed CEMP. Good Practice Measures (Sedimentation and Erosion) Good practice measures for the management of erosion and sedimentation would include the following: • all stockpiled materials would be located outwith a 50m buffer from watercourses, including on up gradient sides of tracks, and stockpiles would be battered to limit instability and erosion; • where possible, stockpiled material would either be seeded or appropriately covered, minimising the area of exposed bare ground; • monitoring of stockpiles/excavation areas would take place during and immediately following extreme rainfall events; • water would be prevented as far as possible, from entering excavations through the use of appropriate cut-off drainage; • where this is not possible, water that enters excavations would pass through a number of settlement lagoons and silt/sediment traps to remove silt prior to indirect discharge into the surrounding drainage system. Detailed assessment of ground conditions would be required to identify locations where settlement lagoons would be feasible; • clean and dirty water onsite would be separated and dirty water would be filtered before entering the water environment; • if the material is stockpiled on a slope, silt fences would be located at the toe of the slope to reduce sediment transport; • the amount of ground exposed, and time period during which it is exposed, would be kept to a minimum and appropriate drainage would be in place to prevent surface water entering deep excavations; • a design of drainage systems and associated measures to minimise sedimentation into natural watercourses would be developed - this may include silt traps, check dams and/or diffuse drainage; • silt/sediment traps, single size aggregate, geotextiles or straw bales would be used to filter any coarse material and prevent increased levels of sediment. Further to this, activities involving the movement or use of fine sediment would avoid periods of heavy rainfall where possible; and



Chapter	Type of Mitigation Compensation or Enhancement	Mitigation, Compensation or Enhancement Measure
		- construction personnel, the Principal Contractor and EnvCoW would carry out regular visual inspections of watercourses to check for suspended solids in watercourses downstream of work areas. Good Practice Measures (Water Abstractions) If water abstraction for construction activities is required, a potential source will be identified at the detailed design stage of the project and following site investigation. An application for an EASR authorisation would then be made to SEPA and managed through the regulation of the EASR. Should a suitable source not be identified, a water bowser would be used. Good practice that would be followed in addition to the EASR regulations includes: - planning of water use so as to minimise abstraction volumes; - reuse of water where possible; - recording of abstraction volumes; and - control of abstraction rates to prevent significant water depletion in a source. Peat Management A Soils and Peat Management Plan shall be implemented to manage excavation, storage, handling, reuse and restoration of peat and soils. Excavated peat shall be reused in reinstatement and restoration works, including reinstating track verges, borrow pits and temporary hardstanding areas. An experienced engineering geologist or geotechnical engineer will be appointed to supervise during setting out, micrositng and construction to advise on peat management and peat stability.
	Operational	Operational Environmental Management Plan An Operational Environmental Management Plan (“OEMP”) would be prepared to maintain the relevant mitigation and management measures established during the construction phase into the operational phase of the Proposed Development.



Chapter	Type of Mitigation Compensation or Enhancement	Mitigation, Compensation or Enhancement Measure
Chapter 11: Cultural Heritage and Archaeology	Pre Construction and Construction	Written scheme of investigation All mitigation related to archaeological assets and their safeguarding will be agreed with Stirling Council through a Written Scheme of Investigation. Demarcation of assets Heritage assets located close to construction works shall be demarcated and protected where avoidance is possible. Protective measures shall be implemented prior to construction commencing in affected areas. Archaeological watching brief and recording Where avoidance of heritage assets is not possible, an archaeological watching brief should be employed during construction works within agreed buffer distances of affected assets. This will include archaeological recording of above-ground remains prior to construction, comprising photographs, measurements, and detailed notes. Toolbox talks Toolbox talks should be held prior to construction to raise awareness of known heritage assets and mitigation measures intended to protect them. In addition, a working protocol should be established to lay out the working procedures should any unrecorded features be discovered.
Chapter 12: Traffic and Transport	Pre Construction and Construction	Construction Traffic Management Plan (CTMP) A detailed CTMP would be agreed with Stirling Council, with input from Police Scotland and Transport Scotland, prior to the commencement of development. The detailed CTMP would include a number of measures to reduce the effects of the construction of the Proposed Development on local receptors and communities, including effects from turbine deliveries (abnormal loads). This would include details of any required temporary widening and other road improvement measures, together with detailed consideration of vehicle swept paths, loadings, structural assessments (where required), temporary street furniture removal details, dust and dirt management, and community engagement. An element of preparation of the detailed CTMP would be a trial run, which



Chapter	Type of Mitigation Compensation or Enhancement	Mitigation, Compensation or Enhancement Measure
		would be undertaken with ALLVs transporting the wind turbine components, which would confirm the accommodation works needed (such as removal of street furniture).
	Construction (General)	General A reputable construction contractor would be procured, with an Environmental Policy and good environmental track record; • All HGVs delivering materials to the Site would be roadworthy, adequately maintained and sheeted as required; • Adequate traffic management and banksmen would be deployed for the movement of HGVs and abnormal loads; and • HGV loads would be maximised to ensure that part load deliveries would be minimised. Turbine deliveries would be undertaken in consultation with the relevant roads authorities (Stirling Council and Transport Scotland) and Police Scotland. Mitigation measures to reduce the potential for dust and dirt to make its way on to the local highway network would be undertaken including the cleaning of vehicle wheels during wet periods and road cleaning where necessary.
Chapter 14: Aviation	Construction and Operation	Aviation Lighting Visible and infra-red lighting shall be installed on the wind turbines in accordance with Civil Aviation Authority, Ministry of Defence and other relevant stakeholder requirements. Prior to construction, wind turbines and crane details shall be notified to relevant aviation stakeholders in accordance with applicable aviation requirements.
Chapter 15: Other issues	Pre Construction and Construction	Access Management Plan A detailed Access Management Plan would be prepared, agreed with Stirling Council and implemented during construction of the Proposed Development. The Access Management Plan would set out provisions for temporary restrictions during construction and any areas of the Site that would have restricted access during the lifetime of the Proposed Development.



Chapter	Type of Mitigation Compensation or Enhancement	Mitigation, Compensation or Enhancement Measure
	Pre Construction and Operation	Shadow Flicker Prior to the operation of the first wind turbine, a Wind Farm Shadow Flicker Protocol will be submitted to and approved by Stirling Council. This would set out the protocol to be followed should a shadow flicker complaint be received from a receptor within the study area, and potential mitigation measures. Should a complaint be substantiated, these mitigation measures would include programming the turbine's shadow flicker control module to minimise impacts at the receptor(s). Shadow flicker control modules, consisting of light sensors and specialised software, would be installed on the turbines that can prevent operation during periods when shadow flicker can be experienced at nearby properties. The installation of a programmable shadow flicker module would allow the control of turbines in order to eliminate shadow flicker. The correct operation of the installed shadow flicker control measures would ensure that there would be no impact from shadow flicker. The operation and performance of the shadow flicker control measures would be monitored on an ongoing basis.



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